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ABSTRACT

Because of course difficulty and dryness, students of elementary accounting often have poor grades and manifest low interest and a 40-50% dropout rate. In answer to these problems, an experimental multimedia approach to teaching the accounting cycle was tested with 58 students against a control group of 62. Both groups consisted of male and female junior college students from 18-27 years old. The traditional approach involved instructor lectures, while the experimental aapproach integrated audiovisual materials with lectures and included an audio-tutorial mode session of individualized instruction in the multimedia laboratory. Study time was approximately equal for both groups, and mental ability, achievement, and attitude were measured for each participant. Although there were no significant differences in achievement and attitudes toward the course between the two groups, students in the experimental section indicated a satisfactory attitude toward the multimedia approach, and a preference for the combined individualized session and lecture instructional method. Students rated the lab experience as valuable two to one. The study suggested the possibility of such additions to the multimedia arrangement as a tutorial during the individualized session, unlimited lab use for study, review, and make-up, and an opportunity for students to borrow audio-visual materials for home study. Testing instruments are included. (TR)

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A COMPARATIVE STUDY OF A TRADITIONAL APPROACH AND A MULTIMEDIA APPROACH TO TEACHING THE ACCOUNTING CYCLE

William E. Squizzero

A MAJOR APPLIED RESEARCH PROJECT PRESENTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF EDUCATION

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A COMPARATIVE STUDY OF A TRADITIONAL APPROACH AND A MULTIMEDIA APPROACH TO TEACHING THE ACCOUNTING CYCLE

By

William E. Squizzero

ABSTRACT

Because of its pervasiveness in business, Elementary Accounting is required to be taken by all students majoring in Business Administration. However, because of the difficulty of the subject matter, the amount of study time required, the fact that it is not an elected subject, the fact that it is frequently taught in an unexciting manner, etc., it is not uncommon for grades to be poor, interest to be low, and for attrition to reach 40 or 50 percent. It was the purpose of this study to experiment with an alternate instructional presentation method to determine whether the problems mentioned above could be alleviated. A multimedia approach was used to teach the accounting cycle to 58 students in an experimental group while the traditional approach was used to teach the same material to a control group consisting of 62 students. Each of the two groups were composed of junior college students of both sexes ranging in age from 18 to 27 years. The statistical design used was a quasi-experimental one consisting of four intact classes--two control and two experimental. The two levels of the independent variable were the traditional approach and the multimedia approach to teaching the accounting cycle. The traditional approach utilized the instructor's lectures as its basic means of delivery, and students met five

periods per week. The multimedia approach utilized an integration of audio-visual materials with the instructor's lectures, and students met four periods per week. In lieu of a fifth classroom period, students in the multimedia group used an audio-tutorial mode (filmstrips and cassette tapes) of individualized instruction in the Multimedia Laboratory. The amount of time students spent studying accounting in school was kept approximately equal for both groups. Mental Ability (IQ), as measured by the Otis Quick-Scoring Mental Ability Test, was categorized as low, medium, or high and was used as a moderator variable. The two dependent variables studied were achievement on the accounting cycle and attitude toward the accounting course. Achievement was measured by two locally constructed tests, a recognition type (multiple choice) and a recall type (procedural). Attitude toward the accounting course was measured by A Scale for Measuring Attitude Toward Any School Subject by H. H. Remmers and E. B. Silance. A second attitude instrument, An Instrument for the Measurement of Expressed Attitudes Toward Multimedia Instruction, was used to assess the reaction of students in the experimental group toward individualized study in the Multimedia Laboratory. The first dependent variable, achievement, was statistically analyzed twice--once for the results of the recognition-type test and once for the results of the recall-type test. In each case, a two-way, 2 x 3 analysis of covariance using verbal-reading ability, math ability, and knowledge of accounting as measured by a recognition-type

test and a recall-type test, showed no significant difference in achievement between the two groups. The two analyses also showed (1) mental ability (IQ) was a significant factor in determining achievement (beyond the .01 level of confidence) and (2) interaction of presentation method and mental ability (IQ) were not significant. The dependent variable attitude toward the course was analyzed by analyses of variance. A one-way analysis showed no significant difference in attitude toward the course between the two groups. Two-way, 2 x 2 analyses showed sex, prior knowledge of accounting, and college major not to be significant in determining student attitudes toward the course by themselves or in interaction with presentation method. Students in the experimental group expressed attitudes which were favorable overall toward the individualized study in the Multimedia Laboratory although the feelings were not strong ones. An ancillary finding showed students somewhat lacking in accepting responsibility for individualized study in the Multimedia Laboratory. A total of 34 percent of the students in the experimental group failed to study more than half of the ten audio-tutorial lessons designated for individualized study in the Lab. A *t*-test (significant beyond the .05 level of confidence) indicated that females tended to assume more responsibility for the individualized study than did males. It was concluded that the multimedia approach was a potentially preferred approach for teaching the accounting cycle for the following reasons: (1) there was no difference in achievement between the two groups;

(2) there was no difference in attitude toward the course between the two groups;

(3) students in the experimental group indicated (a) a satisfactory attitude toward the multimedia approach to learning the accounting cycle, (b) a preference for the multimedia arrangement of four periods of lecture and one period of individualized instruction in the Multimedia Lab per week as compared to the traditional arrangement of five periods of lecture per week, and (c) a 2:1 favorable reaction to the Multimedia Lab experience as being a valuable experience overall;

(4) the multimedia arrangement can include fringe benefits such as a tutorial period during the unused fifth class period, unlimited use of the Multimedia Lab for study, review, and make-up work, use of the Lab at the students' convenience, active participation in the learning process by the student, a change from the repetition of the lecture approach, and the opportunity for students to borrow audio-visual materials for home study.

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INTRODUCTION

Context of the Problem

Because of its pervasiveness in business, Elementary Accounting is required to be taken by all students majoring in Business Administration. However, because of the difficulty of the subject matter, the amount of study time required, the fact that it is not an elected subject, the fact that it is frequently taught in an unexciting manner, and so on, it is not uncommon for grades to be poor, interest to be low, and for attrition to reach 40 or 50 percent. Research is necessary to discover viable alternatives to the traditional lecture approach to teaching accounting--alternatives which will overcome the problems mentioned above. A California study by Cohen (1969) found instructional improvement to be first in a list of 26 critical problems and needs of the two-year college. Research is needed to determine the effectiveness of teaching bookkeeping/accounting using the following procedures (Hopkins, 1972, p. 3): accounting laboratories, individualized learning, and visual presentation (slide-tape, filmloops, transparancies, sound-on-slides).

The traditional college course consists of an instructor's lectures and a textbook as basic resources. To be successful, this method requires high verbal ability and reading comprehension on the part of the student. Thus, the traditional method of instruction is a great handicap to students in the

community college (Coleman, Livingston, Fennessey, Edwards, and Kidder, 1973). Much of the teaching in junior colleges has been patterned after the traditional methods used by the four-year colleges. However, Fredenburgh (1966) states that the traditional methods of teaching are clearly inadequate to meet today's broader range of knowledge as well as today's new breed of college students. The community college is responsible in large part for today's new breed of college students. Because the community college student is different, new approaches to teaching are needed.

The audio-tutorial approach to teaching was pioneered in 1961 by Samuel Postlethwait in an attempt to make some adjustment for the diversity of backgrounds of students in a freshman botany course (Postlethwait, 1974, p. 199). Since then, experiments utilizing different modes of individualizing the instruction have been conducted with varying results. Prickett and Butts (1970) found that students in an audio-tutorial accounting laborabory achieved as well as students in a controlled laboratory. Elliott and Tuckman (1973) found that individualized instruction in a learner-centered environment did not produce significantly higher "standardized" achievement in students studying accounting and that there was no difference in attitude toward school between students receiving individualized instruction and students receiving traditional instruction. In comparing traditional and individualized instruction, Worley (1975) found no significant difference in student learning and no significant difference in student attitudes toward

either mode of instruction. Davis (1971) found that 90 percent of students learning accounting by a multimedia approach preferred that approach to the traditional approach. In studying the responsiveness of adults to multimedia instruction in accounting and psychology, Brown, Cavert, Craig, and Snodgrass (1973) found that achievement on posttests was related to different learner characteristics for different subjects.

Chapman (1966) states that

> if the community college is truly to live up to its commitment of being a "teaching institution" then it must experiment with innovative methods of teaching on the college level because the faculty is the heart of the college. (p. 34)

He further states that

> it is only natural that as professional teachers dedicated to effective teaching, we (community college instructors) should be among the vanguard of educators who actively investigate any concept or device that shows promise for our purpose. (p. 37)

Statement of the Problem

The purposes of this study were (1) to investigate the comparative effectiveness of teaching the accounting cycle by the traditional method and a multimedia method of instruction when mental ability (IQ) is used as a moderator variable, and (2) to assess student attitudes toward accounting as influenced by the method of its presentation.

Review of the Literature

Need for and incidence of individualized instruction.

During the last decade, a process of individualizing instruction

in order to meet the divergent needs of students in our educational institutions has slowly progressed to a point where it is now available in various degrees in almost all educational institutions in the United States. Two notable people in the field of individualized instruction are Postlethwait, who first experimented with the audio-tutorial approach to individualized instruction in 1961, and Keller, who is responsible for establishing the "Keller Plan" or Personalized System of Instruction (PSI) in 1963.

Svara (1972) states that although many schools claim to make use of individualized instruction, no common definition of this term has been agreed upon. He reviewed definitions of "individualized instruction" in five studies and then surveyed 30 community and junior colleges who claimed to be using this method of instruction to learn the components of their programs. It was learned that most programs prescribed objectives, partially set the time of classes, and partially set the location of the media used. The programs did not agree on the location of evaluation of student progress, limits of test time, or the rate of accomplishment.

Individualizing the instruction for community college students has been attempted because educators have found that the traditional lecture method of instruction does nothing to overcome the very divergent backgrounds found among community college students. According to Tirrell (1966), traditional methods of teaching are primarily teacher oriented or "open loop" instructional systems. The teacher plans and organizes

his subject matter and presents to the students what he considers to be relevant. Little provision is made for the student, who usually plays a passive role. Within the traditional instruction model, the student is evaluated by tests which sample the material covered. The test questions may or may not be relevant.

In discussing the lecture method of instruction, Kourilsky (1971) offers the following:

> Breakdowns in communication, when utilizing the lecture method, have been found to be located in either (a) the sender (teacher), (b) the message, or (c) the receiver (listener). The teacher may convey a personal image that--e.g., he is smart, he is dumb, he is insincere . . . . A student may feel so negatively toward the sender of the message that his immediate reaction is to "turn off" the teacher. . . . The learning may be impeded by the quality of the delivery, digression, ambiguity, or the level of abstraction. (p. 22)

In comparing PSI to traditional instruction, Sherman (1974) states the following:

> PSI is rooted in a system: learning reinforcement theory . . . . That is, there is a relationship between behavior and its consequences. Instruction which casts the student in a spectator role, the receiver of a presentation, or, leaves the results of active participation to chance, ignores the law of effect, neglects the functional relation it specified, and breaks the most fundamental law of learning. The traditional lecture system is an example--too often it is not working. (p. vii)

In discussing student participation in the learning process, Roueche (1973) states the following:

> Since the days of John Dewey, we have known that people learn best by doing; by active involvement in the learning process. Passivity is not conducive to changing student behavior. Yet, we continue to see some classes in community colleges where students are little more than sponges whose simple role is to soak up whatever the teacher is throwing

> out. Good teaching makes the student an active learner, an active participant in the learning process. (p. 25)

Roueche and Herrscher (1970) state that

> It is obvious that traditional methods of teaching do not succeed with individuals who are not traditional students. It becomes equally obvious that if the two-year college is ever to achieve its lofty ideals, the institutions will be compelled to experiment--to try new programs and new methods, discarding those which do not succeed and refining those which are successful. (p. 26)

Use of audio-visual media. Individualizing instruction through the use of audio-visual materials as integrated instructional packages rather than using audio-visual materials only as aids to instruction is suggested by Banister (1971, pp. 6-9) in his statement that "the concept of audio-visual devices as mere aids to instruction must be changed; they must be seen as integral parts of the instructional package" (p. 9). He feels that although the concept of integrated instructional systems has been discussed for forty years or more, it is not found in today's educational institutions. Instructional packages, he feels, should be determined by what can best be taught by automated tutorial systems, what by large-group lectures, what by laboratory experience, and what by small-group seminars or other instructional techniques.

Concerning educational technology, Chapman (1966) says, "Whether we like it or not, technology has invaded the classroom. It will in all probability have a greater and greater effect upon us" (p. 34). He goes on to say that as educators,

> we must accept the fact that we can improve our courses and methods of teaching. We must stretch our imaginations, study current and proposed practices, experiment, and then make some bold decisions. We must accept new ideas, new techniques, and the media, not because they are novel or for the sake of change alone, but because they, and the other concepts coming from them, promise to increase effectiveness as teachers. (p. 37)

Regarding technology, Banister (1971) offers the following:

> Education has developed in a slow, loosely planned manner in this country. Technology has often been used as an aid to instruction, but has not yet been made a full partner in the enterprise. . . . Audio-visual materials have been used as aids to instruction, but little else has been done with this vast resource. (p. 56)

To investigate the effect of mathematics laboratory experiences on middle school students' mathematical achievement and their attitude toward mathematics, Smith (1973) exposed experimental group students to 40-minute laboratory sessions twice weekly in lieu of classroom sessions while control group students experienced only the classroom sessions. The results showed no significant differences in achievement or attitude between experimental and control groups by grade level or collectively.

In her study to determine whether the educationally disadvantaged student could achieve academic success in Polk Community College's multimedia Biology 101 course, MacQueen (1973) studied 44 students whose stanine scores were between one and four on the Florida Twelfth Grade Performance Test. With academic success being defined as receiving a grade of C or better in the course, the results showed that 29 of the

disadvantaged students were able to pass the multimedia course. It was concluded that the multimedia approach to teaching college biology was successful in improving grades and allowing students to earn credit who previously would have been placed in noncredit courses.

Phillips and Utz (1973) have reported that the use of an individualized, self-paced, media-oriented approach to remedial algebra at the community college level proved to be successful. Their data show that completion rates were 50 percent higher than in traditional courses, learning was 11 percent to 18 percent higher, more efficient use was made of teacher time, and the course was enjoyed by students.

Morman (1971), however, in a study comparing the audio-tutorial method of instruction with the traditional lecture-discussion method, found results which differed from those of Phillips and Utz. She concluded that there was no difference in the effectiveness of either method in teaching remedial algebra to junior college students and that there was no significant difference in the attrition rate in using the two methods.

In a study comparing long-term retention of audio-tutorial instruction with that of lecture-discussion instruction, Gimmel (1974) found no significant differences or interactions in either learning gain or retention. An indirect result of the study indicated that the actual amount of learning loss of the subject matter (tort liability) was not significant.

Porreca (1971) measured achievement and retention of economic concepts when taught to high school students by a programmed textbook method versus an overhead projector method which made extensive use of transparancies. Achievement and retention were measured by two different tests. One test showed a significant difference in both achievement and retention in favor of the programmed textbook-instructed students. The second test showed no significant difference between groups for achievement, but showed a significant difference in retention of basic economic concept understanding in favor of the overhead projector-instructed students. One of the conclusions was that students with a low reading comprehension level would benefit more from a visual instructional approach.

In general, student response to learning via multimedia instructional programs has been favorable. Brown et al. (1973) investigated the relationships between the characteristics of adult learners and their responses to learning accounting and psychology via multimedia instructional programs in an open university system. It was concluded that adult learners reacted positively to the mediated approaches, but that both subject matter and personal characteristics influenced achievement and student acceptance.

Auto-tutorial systems. Banister (1971) reports that at Fullerton Junior College several math courses are taught by a multimedia instructional system which uses a combination of filmstrips, tapes, worksheets, seminars, and quiz sessions.

Students spend three hours a week in class and about two hours in a free laboratory where new concepts are presented. The program uses a modified self-pacing system; students may take as much time as necessary to complete a unit, but must take each quiz and test on a prescribed day. Class meetings are used to review the unit, answer students' questions, provide motivation, and administer quizzes and tests. Lecturing is not done in class meetings.

When the "auto-tutorial" system at Fullerton was compared with the traditional method, there was no clear superiority of either method; but when a difference was detected, it was in favor of the auto-tutorial system. It was found that the auto-tutorial system lowered the attrition rate and made useful materials available for study by students in more advanced classes.

Student attitudes to the auto-tutorial system at Fullerton were favorable and reflected the following: (1) many auto-tutorial students tended to increase in self-confidence and were willing to take another auto-tutorial math course (63%), but not a traditional one (34%); (2) many felt that the auto-tutorial system was less monotonous (67%) and easier to understand (47%) than the traditional lecture method; (3) the beneficial features of the auto-tutorial system were the ability to stop and repeat tapes and film lectures, the opportunity to enter the lab at their own convenience, the periodic self-mastery tests, and the small-group discussion sessions.

Banister (1971) also reports that the Biology Department at Golden West College in California uses a multimedia system of instruction. The learning system uses general assembly sessions for guest speakers, motion pictures, motivational lectures, and final exams. After the general assembly sessions, students schedule themselves into an auto-tutorial lab. Instructors have identified several advantages of the auto-tutorial lab: (1) the students are free to use it whenever they wish; (2) they can work at their own pace; (3) they have ready access to a tutor who can give individual attention without interfering with other students; (4) they can make up missed lab work or can review extensively; (5) they can make up their work if they have been absent; (6) it offers a means of documenting instructional effectiveness and course content for accreditation teams and sister institutions.

Audio-visual instruction in accounting. Prickett and Butts (1970), using a four-year and a two-year college, tested the effectiveness of audio-tutorial and programmed instructional media as supplements to the lecture-type course in accounting principles, the experimental variable being the laboratory experience, with all other factors of the teaching process held as constant as possible. Their findings were as follows: (1) there was no significant difference in achievement between students receiving traditional instruction with a controlled laboratory experience and students receiving traditional instruction with an audio-tutorial laboratory experience; (2) there was no significant

difference in achievement between students receiving traditional instruction with a controlled laboratory experience and students receiving traditional instruction with a programmed instruction laboratory experience; (3) there was no significant difference in achievement between students receiving traditional instruction with an audio-tutorial laboratory experience and students receiving traditional instruction with a programmed instruction laboratory experience. The investigators concluded that through the use of the programmed or the audio-tutorial laboratory, it is possible to obtain equal achievement compared to students receiving the controlled laboratory and still allow the student the opportunity to select the time most suitable for his laboratory experience.

In a study comparing an individualized, self-paced instructional approach which made use of slides and tapes with a traditional instructional approach to teaching accounting, Elliott and Tuckman (1973) found that there was no difference in "standardized" achievement nor was there any difference in attitude toward school between the two groups. However, students in the individualized instruction group required less study time to attain the same achievement results. Additionally, in transfer problem solving, individually-taught students manifested significantly more search initiative, spent more time in problem solving, and had more correct solutions than students who were traditionally taught. Differences between the two groups in the length of problem solutions and in the correctness of definitions, while not significant,

favored the individually-taught group. The authors concluded that the individualized approach to teaching accounting in the two-year college was more effective than the traditional approach.

Onah (1971) compared the teaching of accounting principles to junior college students through the Audio-Visual-Tutorial (AVT) system with the conventional (lecture-discussion) method. Students in the AVT group received individual instruction in carrels in the AVT accounting laboratory, using slides and tapes. Additional assistance was available from a tutor at the student's convenience. Based on periodic tests and the final examination, he concluded that the AVT system of instruction was as effective as the conventional method in teaching accounting principles. It was also found that low aptitude students performed better with the AVT system when it allowed them to spread their time and work at their own pace. A significant difference at the .01 level of confidence regarding students' liking the course favored the group taught by the AVT system.

Larson (1962) conducted a study using three accounting laboratory treatment groups in a first course in accounting principles. The "Neglected" treatment group did not have a formal laboratory period. The "Regular" treatment group experienced a traditional accounting laboratory. The "Enriched" treatment group experienced a laboratory which included extensive use of visual aids, review lectures, and greater attention to detail and to individual instruction.

In addition to the laboratory work, all students received the same accounting lectures three hours per week. The results showed that students assigned to the "Enriched" laboratory treatment obtained significantly higher mean total achievement scores than those assigned to the "Regular" or the "Neglected" laboratory treatment. A large percentage of the dropouts (53.8%) came from the "Neglected" laboratory treatment. Of these, 86% were males who had no high school bookkeeping.

In a previous study at Rhode Island Junior College, Silva (1973) compared a chalkboard presentation and a computer-assisted, audio-visual presentation of basic accounting principles. The chalkboard presentation used the traditional lecture approach while the computer-assisted presentation used a computer terminal with synchronized audio-visual materials (slides and tapes) to present the subject matter. The findings showed the presentation methods to be equally effective. Student reaction to the computer-assisted presentation method was favorable. It was concluded that (1) computer-assisted instruction could be implemented successfully as a method of teaching accounting on the junior college level and that (2) audio-visual media can be successfully integrated in a computer-assisted instruction program as a means of delivering the main thrust of the instruction.

Conclusion. Although many research studies have shown that alternate instructional methods have not produced greater achievement (as achievement is commonly measured)

than the traditional method has, alternate instructional methods have been found to be at least as good and to offer other benefits such as higher course completion rates and greater student satisfaction with the teaching method. Further research may help to determine the conditions and situations under which alternate methods of instruction may be superior. Information on less commonly measured learning outcomes such as application of classroom learning may also be a result.

Hypotheses

The following hypotheses were formulated:

Hypothesis 1: Students who are taught the accounting cycle by a multimedia approach will show significantly higher achievement as measured by posttest means than will students who are taught by the traditional approach.

Hypothesis 2: The multimedia approach will not differ significantly from the traditional approach in affecting the achievement of students of high, medium, and low mental ability (IQ).

Hypothesis 3: Students who are taught the accounting cycle by a multimedia approach will possess more positive attitudes toward the accounting course than will students who are taught by the traditional approach.

Hypothesis 4: Sex, prior knowledge of accounting, and college major will not affect student attitudes toward the accounting course.

Rationale for Hypotheses

The most common approach used by educators to transmit knowledge has always been the verbal approach. Overall, the verbal approach has been reasonably successful, and therefore has withstood the test of time. Studies have shown, however, that when the basic verbal medium is supplemented with other media, it is possible for greater learning to result.

According to Bloom (1968), evidence indicates that students learn best by a multitude of sensory experiences; listening needs to be supplemented by seeing and doing.

Postlethwait (1974) states the following regarding the use of multimedia:

> Individuals differ in their responsiveness to different kinds of communication devices. Some people learn well through reading, some can learn best by auditory communication, and others can learn best by literally handling specimens and performing experiments. The audio-tutorial system thus provides an opportunity for subject matter to be covered in a greater variety of ways with the student exploiting the medium which communicates most directly and most effectively for him. . . . It stands to reason that if learning events are to be complementary and to have some relationship, they should be brought into close proximity and properly sequenced. . . . The audio-tutorial system permits the student to bring all of these learning experiences into an integrated sequence so that each learning event may enhance or complement the adjacent ones and thus result in a "synergistic" effect. . . . Any good educational system must be based on the fact that "learning must be done by the learner." It must involve him (the student) in the process and must always provide a high degree of flexibility and adaptation to individual needs. (p. 201)

In a study to compare the amount of learning by students enrolled in a conventionally-taught introductory psychology course with the amount of learning by students enrolled in the same course taught by the individualized approach, McMichael

and Corey (1974) found that students in the individualized instruction group learned more and rated the course higher than did students in the conventionally-taught group. In a later follow-up study, Corey and McMichael (1974) found retention of the material learned by students in a PSI introductory psychology course to be superior to the retention of the same material by students in a conventionally-taught course both at the conclusion of the course and when retested ten months later.

Born, Gledhill, and Davis (1974) assigned students in a Psychology of Learning course to either a lecture section, one of two personalized instruction sections, or a fourth section that rotated across all three teaching procedures. Examination performance of students in the personalized sections was found to be superior to that of students in the lecture section. An analysis of performance by item type revealed that students in the lecture section scored lower on all item types, but the greatest differences occurred on items that required written responses (essay and fill-in items) rather than recognition responses (multiple choice items). A gross analysis of student performance in the class rotated across the instructional procedures suggested that personalized instruction had its greatest impact on students with "average" to "poor" academic records. Eighty-five percent of the students completing the personalized classes indicated that they enjoyed the class and would recommend it highly to their friends; only about half of the students in the lecture section indicated they would make a similar recommendation.

Roth (1974) states that nonprint media can be used in the same way that print media might be used--as a way into other ideas, as thought starters, as activities that put everyone at the same beginning point, and as a means of making relationships between ideas more apparent to the students. She maintains that nonprint media offer alternative teaching strategies that are especially helpful to the nonverbal and nonprint-oriented student.

Operational Definition of Variables

Independent Variable--The method of instruction used in the study.

A. Traditional Instruction Method

The traditional instruction method is defined as the use of verbal presentation of subject matter, discussion, chalkboard demonstrations, supervised study (laboratory sessions), the overhead projector, the textbook, and a study guide. Students attend regularly scheduled classes five days per week.

B. Multimedia Instruction Method

The multimedia instruction method is defined as the use of all of the above-mentioned media except for a different form of study guide. The verbal presentation of subject matter is supplemented with audio-visuals in the form of

cassette tapes and filmstrips which are integrated with the instructor's lecture. Students use cassette tapes and filmstrips in a Multimedia Laboratory on an independent study basis.

Moderator Variable--mental ability, categorized as low, average, or high IQ, as measured by the Otis Quick-Scoring Mental Ability Test, Gamma Test, Form FM.

Dependent Variable

The dependent variables were:

A. Academic Achievement

Achievement is defined as the numerical score obtained by a student on each of two posttests on the accounting cycle--The Accounting Cycle Test, a recognition-type test on accounting principles and procedures, and The Accounting Cycle Procedures Test, Form B, a recall-type test of accounting procedures.

B. Attitudes

The definition of attitudes in this study is the extent of students' expressed positive or negative feelings toward the accounting course as measured by A Scale for Measuring Attitude Toward Any School Subject (Remmers & Silance, 1934; Shaw & Wright, 1967), one of several generalized attitude scales.

Operational Restatement of the Hypotheses

Students in Elementary Accounting I who were taught the accounting cycle by a multimedia method as opposed to the traditional method, were expected to exhibit significantly greater academic achievement and to possess more favorable attitudes toward the accounting course.

Significance of the Study

At Rhode Island Junior College, as at many other two-year colleges nationwide, the present mode of instruction in Elementary Accounting I is almost exclusively the traditional lecture approach. As mentioned previously in this paper, that mode of instruction is not fully meeting the needs of the two-year college student--a student who is unique in many ways. The fact that approximately 20 percent of the enrollees in Elementary Accounting I at Rhode Island Junior College receive the minimum passing grade, coupled with the fact that approximately 30 percent of the enrollees do not receive credit for the course because of withdrawal or failure indicate that the present instructional delivery system is not meeting the needs of the students.

It is obvious that alternate approaches to teaching accounting are needed. However, alternate approaches must not be implemented based on blind optimism, but rather on careful research and application of those results which prove to be satisfactory.

Upon finding that students in a two-year college who studied accounting through an individualized approach required less study time, manifested more search initiative, spent more time in problem solving, and had more correct solutions than students who studied accounting through the traditional approach, Elliott and Tuckman (Note 1) concluded that the individualized approach to teaching accounting in the two-year college was more effective.

It was the purpose of this study to investigate the possibility of altering the instructional approach presently being used to teach accounting at Rhode Island Junior College. The study provided information on student acceptance of an alternate approach as well as information on student achievement when taught by that alternate approach.

It was expected that the proposed study might provide the genesis for a multimedia instructional approach to teaching accounting so that those students who could benefit from such an approach would have it at their disposal.

METHOD OF INVESTIGATION

Subjects

The sample for the study consisted of 120 freshmen students enrolled in Elementary Accounting I at Rhode Island Junior College in the fall of 1975. These students constituted four intact classes combined into two groups--a control group and an experimental group consisting of 62 and 58 students respectively. Males and females ranging in age from 18 to 27 years were included in both groups. Almost all students were Business Administration majors. A small number of students were Liberal Arts or Data Processing majors. The status of the students was fulltime or parttime and matriculating or nonmatriculating. Some of the students had prior experience in the form of high school bookkeeping, college accounting, or on-the-job accounting experience. Analysis of covariance compensated for any differences in knowledge of accounting as well as differences in verbal-reading ability and quantitative ability, all of which were used as covariates.

Tasks

The various principles and procedures of the accounting cycle as presented in the first three chapters of Accounting Principles (Niswonger & Fess, 1973) constituted the material to be mastered by the students. Included were journalizing in a general journal; posting to a general ledger; taking a

trial balance; completing a worksheet; preparing an income statement, a capital statement, and a balance sheet; recording and posting adjusting entries; recording and posting closing entries; and taking a post-closing trial balance.

During the first week of the course, students were administered pretests measuring verbal-reading ability, quantitative ability, mental ability, and knowledge of accounting (as measured by two types of tests--a recognition type and a recall type). At the conclusion of instruction, students were administered two accounting achievement post-tests--a recognition type and a recall type--in addition to an instrument to assess their attitudes toward accounting. Students in the experimental group were administered a second attitude instrument to assess their attitudes toward the Multimedia Lab instructional experience.

Independent Variable

Subject matter to be mastered by the students was presented by two methods--the traditional method and a multimedia method. The traditional method of instruction (control group) encompassed verbal presentation of the subject matter as well as discussion, the use of chalkboard demonstrations, and the overhead projector (for showing solutions to assigned problems and ocassionally in place of the chalkboard). Laboratory sessions (supervised study on assigned accounting problems) were also used as they usually are in the course. The laboratory sessions consisted of one of the regularly scheduled 50-minute class sessions. Since almost

all problems assigned could not be completed in 50 minutes, students finished the problems by themselves outside of class. Students in the control group used a textbook (Niswonger & Fess, 1973) and a study guide (Howe & Carlson, 1973) published by the same publishing company. The study guide included short-answer questions and short problems. Control group students attended regularly scheduled 50-minute classes five days per week.

The multimedia method of instruction (experimental group) was exactly the same as the traditional method except for the following:

1. In place of the study guide published by the publisher of the textbook, students in this group used a study guide (Dupree, Marder, & Carter, 1974) published by a different publishing company which included short-answer questions, short problems, and reading material. The reading material was not assigned. Any reading done was done on an as-desired basis by the students. Short-answer questions and short problems that were assigned were equated to exercises in the study guide used by the control group. A different study guide was used by the experimental group because it correlated better with the audio-visual materials used by that group.
2. Some of the instructor's verbal presentations to the experimental group had audio-visual modules (cassettes and filmstrips) integrated with them so that each module was experienced twice by the students--portions of each module in class and the entire module in the Multimedia Lab.

At the instructor's discretion, the audio-visual modules were integrated in three ways. At times a module was allowed to run uninterrupted. At other times, only the visual portion was used while the instructor emphasized a point that had been made in the audio or made his own comments in lieu of the audio. Occasionally, if a point to be emphasized was lengthy, both audio and video were turned off for the duration of the explanation. The instructor also used his discretion in deleting portions of the audio-visual module that were too time consuming to use or that were not directly related to the lesson being given.

3. Students in the experimental group attended regularly scheduled 50-minute classes four days per week instead of five. In lieu of a fifth regularly scheduled class, students used cassette tapes and filmstrips (Dupree, Marder, & Carter, 1973) in a Multimedia Laboratory on an independent basis.

Moderator Variable

Students were classified as low, medium, or high mental ability (IQ) as measured by their performance on the Otis Quick-Scoring Mental Ability Test, Gamma Test, Form FM. A reliability coefficient of .88 and a standard error of 3 points are reported for the test (Buros, 1959).

Dependent Variables

The dependent variables were (1) achievement on the accounting cycle and (2) attitude toward the accounting course.

Student achievement was determined by performance on a 55-question multiple choice test on accounting principles and procedures (Appendix A), and by performance on a test of the ability to perform accounting cycle procedures (Appendix C). Both tests were constructed by the investigator and were used as power tests by allowing enough time for all students to complete them. Post-test mean scores on each test were compared for the two groups.

Reliability of The Accounting Cycle Test, a 55-question multiple choice test, was achieved by taking 24 questions from a test on the accounting cycle which was used by Silva (1973) in a study to determine the effectiveness of teaching accounting through computer-assisted instruction at Rhode Island Junior College. The 24 questions were part of his 50-question multiple choice test which had an alternate forms equivalency coefficient of .91. The remaining questions were drawn from an 80-question multiple choice test on the accounting cycle, which was used by the investigator in a previous study (Squizzero, Note 2). The test had a reliability coefficient of .88 as measured by the Kuder-Richardson Formula 21. Since each question had undergone computer analysis which provided difficulty and discrimination indices, questions were selected on the basis of satisfactory difficulty and discrimination indices.

In addition, the reliability coefficient of the final test instrument was estimated by using the Kuder-Richardson Formula 21 (Cronbach, 1960, p. 141). Based on the data from

120 tests the Kuder-Richardson r was computed to be .87 which was significant beyond the .01 level of confidence.

Alternate forms A and B of The Accounting Cycle Procedures Test were created to examine students' performance on parts of the accounting cycle; namely, journalizing, posting, taking a trial balance, preparing an income statement and balance sheet, and recording closing entries. Since they were designed as power tests, the complete accounting cycle was not included in order to keep them relatively short. A pilot administration of both forms to a group of 52 students not involved in the study indicated a coefficient of reliability of .87.

Content validity was achieved by tailoring the tests to measure mastery of the accounting cycle in accordance with the objectives of the course. Initial judgements were made by the investigator. The tests were subsequently reviewed by Professors Armstrong and Silva of the Business Administration Department at Rhode Island Junior College who made suggested revisions after analyzing the tests to determine whether the tests did, in fact, measure principles and practices of the accounting cycle according to course objectives.

Student attitudes toward the course were determined by the use of A Scale for Measuring Attitude Toward Any School Subject (Remmers & Silance, 1934) (Appendix D). Reported reliability of the instrument (Shaw & Wright, 1967, p. 294) using equivalent forms ranges from .81 to .90, using both

high school and college students and using different school subjects as attitudinal referents. Content and concurrent validity have been established.

In addition to the above-mentioned attitude scale, students in the experimental group completed a second instrument designed to measure their attitudes toward the Multimedia Lab instructional experience (Appendix E). The first 30 questions were adapted from An Instrument for the Measurement of Expressed Attitude Toward Computer-Assisted Instruction (Brown, 1966). Items 31-33 were adapted from Questionnaire on Individualized Instruction (Worley, 1975). The remaining items were written by the investigator.

Procedures

Prior to any instruction, students were administered four pretests. One of these pretests, the Otis Quick-Scoring Mental Ability Test, Gamma Test, Form FM, provided IQ data which were used for the moderator variable. The other three tests provided data which were used for four covariates. The Accounting Cycle Test (multiple choice; Appendix A) and the Accounting Cycle Procedures Test (procedural; Appendix B) were used to measure students' existing knowledge of accounting. The data gathered from the two tests were used as two separate covariates. The Orientation Test, Form E, of the American Institute of Certified Public Accountants (AICPA) was used to determine students' verbal-reading ability and quantitative ability. The verbal-reading ability data were used

as the third covariate, and the quantitative ability data as the fourth covariate.

The AICPA Orientation test is an aptitude test which is essentially a measure of intelligence slanted toward business. The verbal portion of the test has a reliability coefficient of .85 and the quantitative portion has a reliability coefficient of .88 as measured by the Kuder-Richardson Formula 21. A standard error of 3.4 and 2.6 respectively is reported (AICPA Testing Project Office).

Attendance in the Multimedia Lab for students in the experimental group was compulsory. Records were kept showing the date of the student's attendance, the module (audio-visual lesson) he had used the amount of time required to complete the module. Each student was supposed to use a total of ten modules (Modules 1-11; Module 3 excluded) using each module only once. After each module, the student completed a self-test in the Student Outlines (Dupree, Marder, Carter, 1973) to evaluate his learning. At the conclusion of the ten modules, each student was administered a short test on the content of those modules and received a grade on his performance. The purpose of the test was to provide extrinsic motivation for students to complete all modules. The same test was also administered to the control group to avoid any testing bias.

Two instructors participated in the study, each teaching one control group and one experimental group in order to control teacher variables. Subject matter, homework,

classroom lab assignments, teaching pace, test dates, and hours per week of accounting instruction were equated as much as possible to control those variables. All tests administered were evaluated by the investigator.

The time span of the experiment was approximately six weeks.

Design

The study used the nonequivalent control group design, a quasi-experimental design, since intact groups were used.

X_0 = Traditional instruction (control group)

X_1 = Multimedia instruction (experimental group)

Y_1 = Low IQ

Y_2 = Medium IQ

Y_3 = High IQ

O_1	X_0	Y_1	O_2
O_3	X_1	Y_1	O_4
O_5	X_0	Y_2	O_6
O_7	X_1	Y_2	O_8
O_9	X_0	Y_3	O_{10}
O_{11}	X_1	Y_3	O_{12}

Data Analysis

Posttest data for the dependent variable achievement on the accounting cycle as measured by two different tests were analyzed by use of a two-way, 2 x 3 analysis of covariance (ANCOVA) using math ability, verbal-reading ability, and knowledge of accounting as covariates. The statistical procedure utilizing the independent variable, type of instruction (A), and the moderator variable, IQ (B), determined whether there was a significant A-effect, a significant B-effect, or a significant AB interaction. For the dependent variable achievement, a significant A-effect indicated the superiority of either presentation; a significant B-effect indicated the superiority of any of the IQ groupings; and a significant AB-effect indicated that the effects of the presentation method were based on an interaction with IQ.

Data for the dependent variable attitude toward the accounting course were analyzed by a one-way analysis of variance (ANOVA) and a two-way, 2 x 2 analysis of variance for each of the following moderator variables: sex, prior knowledge of accounting, and college major. The statistical procedure utilizing the independent variable, type of instruction (A), with each of the moderator variables, sex (B), prior knowledge of accounting (C), and college major (D) determined whether there was a significant effect of the independent variable, the moderator variable, and any interaction between the two.

For all three moderator variables, a significant A-effect indicated a difference in attitude resulting from presentation method. In the case of sex (B), a significant B-effect indicated a difference in attitude between the sexes; a significant AB-effect indicated that the effects of the presentation method on attitude were based on an interaction with sex. In the case of prior knowledge of accounting (C), a significant C-effect indicated a difference in attitude between students who did and students who did not have some knowledge of accounting before entering the course; a significant AC-effect indicated that the effects of the presentation method on attitude were based on an interaction with a student's prior knowledge of accounting. In the case of college major (D), a significant D-effect indicated a difference in attitude between students who were and students who were not Business Administration majors; a significant AD-effect indicated that the effects of the presentation method on attitude were based on an interaction with a student's major.

The second attitude instrument (completed by the experimental group only) was not statistically analyzed but simply had its responses tabulated to indicate students' responses to attitudinal questions regarding the Multimedia Laboratory experience.

Confidence levels used for significance of statistically analyzed data were .01 or .05.

RESULTS

Hypotheses 1 and 2

Hypotheses 1 and 2 stated the following:

1: Students who are taught the accounting cycle by a multimedia approach will show significantly higher achievement as measured by posttest means than will students who are taught by the traditional approach.

2: The multimedia approach will not differ significantly from the traditional approach in affecting the achievement of students of high, medium, and low mental ability (IQ).

The dependent variable achievement was measured by two different tests; The Accounting Cycle Test, a recognition-type test, and The Accounting Cycle Procedures Test, a recall-type test. Separate two-way analyses of covariance were completed for each test's data using mental ability as the moderator variable and presentation method of subject matter as the independent variable. In each analysis, differences in students' verbal-reading ability, math ability, and knowledge of the accounting cycle (as measured separately by the recognition test and the recall test) were statistically controlled by using them as covariates. Pretest scores provided data for four covariates.

Achievement as measured by The Accounting Cycle Test. As shown in Table 1, the obtained F ratio of 1.43 for 1 and

110 degrees of freedom was not sufficient to show a significant difference in achievement based on presentation method. Therefore, Hypothesis 1 was rejected. Adjusted means of 38.5 for the traditional group and 39.0 for the multimedia group are shown in Table 2.

Table 1

Effects of Presentation Method and Mental Ability (IQ) on Posttest Achievement, The Accounting Cycle Test--Analysis of Covariance

Source	df	Mean Square	F
Presentation Method	1	52.55	1.43
Mental Ability (IQ)	2	405.95	11.10*
Presentation x IQ Levels	2	41.78	1.14
Error	110	36.58	....

Note. Covariates: verbal-reading ability; math ability; knowledge of accounting (recognition test); knowledge of accounting (recall test).

*$p < .01$

Mental ability proved to be a significant factor in determining posttest achievement (Table 1). The obtained F ratio of 11.10 for 2 and 110 degrees of freedom was significant beyond the .01 confidence level. As shown in Table 2, adjusted means for high, medium, and low levels of mental ability were 40.8, 40.9, and 34.5 respectively. Students of both high and medium mental ability outperformed students of

low ability. However, students of high mental ability did not outperform students of medium mental ability.

Table 2

Effects of Presentation Method and Mental Ability (IQ) on Posttest Achievement, The Accounting Cycle Test-- Adjusted Means

Mod. Var. IQ Levels	Independent Variable: Trad. Method	No.	M/media Method	No.	Totals Both Groups	
High (112-132)	41.2	23	40.3	17	40.8	40
Medium (102-111)	39.4	22	42.7	18	40.9	40
Low (81-101)	33.5	17	35.3	23	34.5	40
Totals	38.5	62	39.0	58	38.7	120

Differences in achievement based on an interaction of presentation method and mental ability were not significant (Table 1). The obtained F ratio of 1.14 for 2 and 110 degrees of freedom was not sufficiently high to indicate a significant interaction between presentation method and mental ability. Therefore, Hypothesis 2, which stated that the interactive effects of presentation method and mental ability (IQ) would not differ significantly, was accepted.

As shown in Table 2, students of high, medium, and low mental ability achieved respective posttest adjusted mean scores of 41.2, 39.4, and 33.5 in the traditional group and 40.3, 42.7, and 35.3 in the multimedia group. The adjusted mean scores are shown in graphic form in Figure 1. Although

the high IQ group performed slightly lower with the multimedia method than might be expected, the interaction did not attain significance.

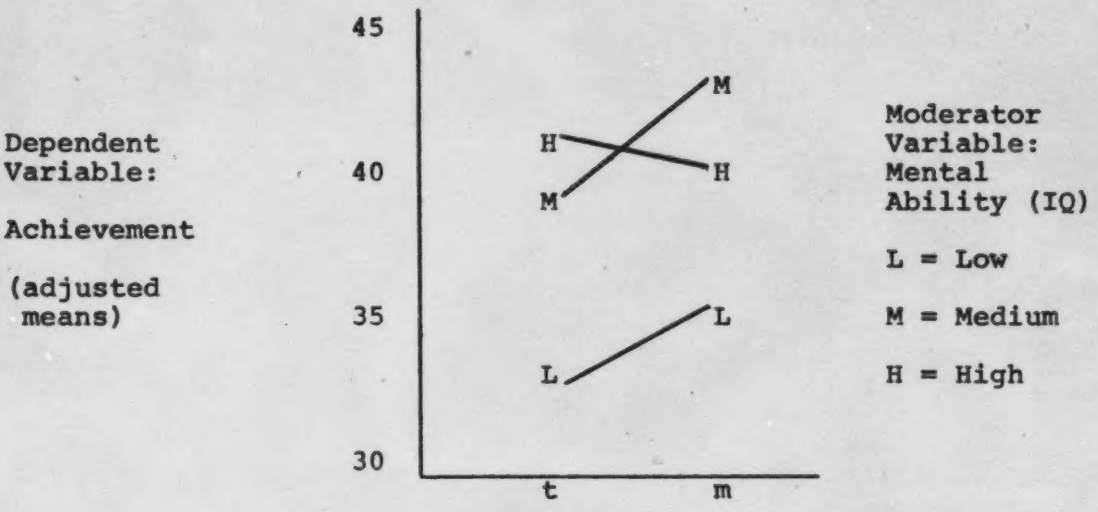

Figure 1. Interactive effects of presentation method and mental ability (IQ) on achievement on The Accounting Cycle Test (recognition type).

Achievement as measured by The Accounting Cycle Procedures Test. As shown in Table 3, the obtained F ratio of .0009 for 1 and 110 degrees of freedom was not sufficient to show a significant difference in achievement based on presentation method. Therefore, Hypothesis 1 was rejected. Adjusted means of 18.5 for the traditional group and 18.1 for the multimedia group are shown in Table 4.

Mental ability was a significant factor in determining posttest achievement (Table 3). The obtained F ratio of 7.18

for 2 and 110 degrees of freedom was significant beyond the .01 confidence level. As shown in Table 4, adjusted means for high, medium, and low levels of mental ability were 20.6, 18.0, and 16.3 respectively.

Table 3

Effects of Presentation Method and Mental Ability (IQ) on Posttest Achievement, The Accounting Cycle Procedures Test--Analysis of Covariance

Source	df	Mean Square	F
Presentation	1	.01	.0009
Mental Ability (IQ)	2	105.81	7.18*
Presentation x IQ	2	21.31	1.45
Error	110	14.74	....

Note. Covariates: verbal-reading ability; math ability; knowledge of accounting (recognition test); knowledge of accounting (recall test).

*$p < .01$

Differences in achievement based on an interaction of presentation method and mental ability were not significant (Table 3). The obtained F ratio of 1.45 for 2 and 110 degrees of freedom was not sufficiently high to indicate a significant interaction between presentation method and mental ability. Therefore, as it was with the Accounting Cycle Test, Hypothesis 2 was accepted. Table 4 shows that students of high, medium, and low mental ability achieved respective

Table 4

Effects of Presentation Method and Mental Ability (IQ) on Posttest Achievement, The Accounting Cycle Procedures Test--Adjusted Means

Mod. Var. IQ Levels	Independent Variable: Trad. Method	No.	M/media Method	No.	Totals Both Groups	
High (112-132)	21.2	23	19.8	17	20.6	40
Medium (102-111)	18.1	22	17.8	18	18.0	40
Low (81-101)	15.4	17	17.0	23	16.3	40
Totals	18.5	62	18.1	58	18.3	120

posttest adjusted mean scores of 21.2, 18.1, and 15.4 in the traditional group and 19.8, 17.8, and 17.0 in the multimedia group. The adjusted mean scores are shown in graphic form in Figure 2. Although the low IQ group performed slightly

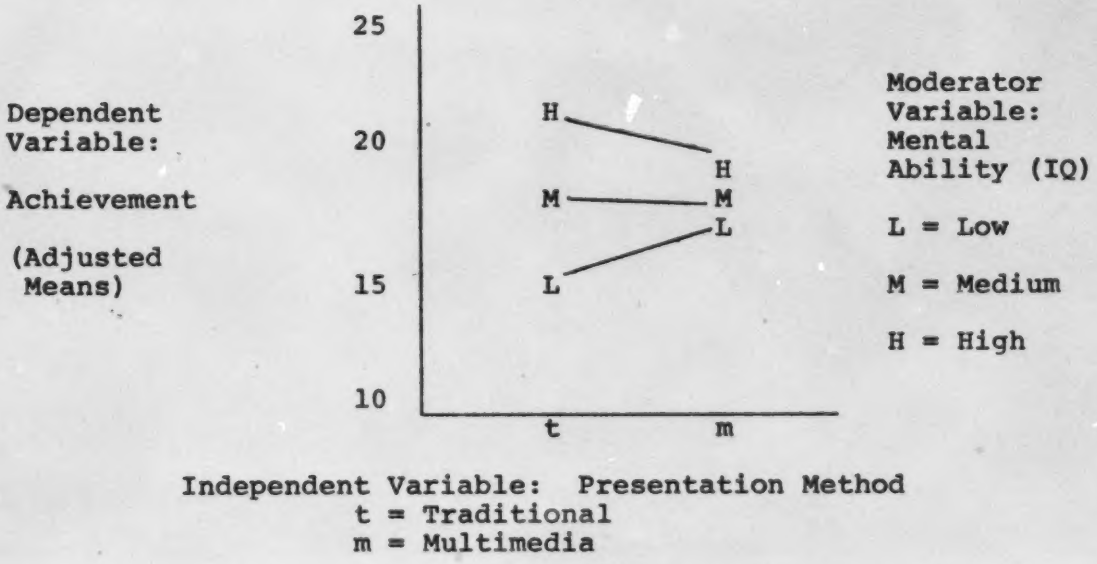

Figure 2. Interactive effects of presentation method and mental ability (IQ) on achievement on The Accounting Cycle Procedures Test (recall type).

better with the multimedia method than might be expected, the interaction failed to attain significance.

Hypotheses 3 and 4

Hypotheses 3 and 4 stated the following:

3: Students who are taught the accounting cycle by the multimedia approach will possess more positive attitudes toward the accounting course than will students who are taught by the traditional approach.

4: Sex, prior knowledge of accounting, and college major will not affect student attitudes toward the accounting course.

A one-way analysis of variance was used to compare each group's attitude toward the accounting course. In a two-way analysis of variance, sex, prior knowledge of accounting, and college major were studied as moderator variables to the independent variable, presentation method. Data were drawn from student responses to the measuring instrument, A Scale for Measuring Attitude Toward Any School Subject. Only 116 of 120 questionnaires were usable (60 from the control group and 56 from the multimedia group).

Hypothesis 3. The mean attitude scores were 7.91 for the traditional group and 7.83 for the multimedia group. Table 5 shows an obtained F ratio of .07 for 1 and 114 degrees of freedom which was not sufficient to show a significant difference between the two groups in attitude toward the accounting course. Hypothesis 3 was rejected.

Hypothesis 4. (1) For the moderator variable sex, Table 6 indicates an obtained F ratio of 1.26 for 1 and 112 degrees

Table 5

Effect of Presentation Method on Attitude Toward Accounting--Analysis of Variance

Source	df	Mean Square	F
Presentation Method	1	.17	.07
Error	114	2.45	....

Note. Group means: Traditional = 7.91
Multimedia = 7.83

of freedom. The figure was not sufficiently high to indicate a significant difference in attitude toward the course between males and females. Therefore, Hypothesis 4 could not be rejected on the basis of sex.

Table 6

Effects of Presentation Method and Sex on Attitude Toward Accounting--Analysis of Variance

Source	df	Mean Square	F
Presentation Method	1	0.02	0.009
Sex	1	3.09	1.26
Presentation x Sex	1	1.19	0.49
Error	112	2.45	....

Table 7 shows mean attitude scores of 7.77 for males and 8.13 for females. Mean attitude scores for males and females within each group are also presented.

Table 7

Effects of Presentation Method and Sex on Attitude Toward Accounting--Mean Attitude Scores

Mod. Var. Sex	Independent Variable: Trad. Method	No.	M/media Method	No.	Totals Both Groups	
Male	7.87	43	7.67	41	7.77	84
Female	8.00	17	8.26	15	8.13	32
Totals	7.91	60	7.83	56	7.87	116

Differences in attitude based on an interaction of presentation method and sex were not significant (Table 6). The obtained F ratio of .49 for 1 and 112 degrees of freedom was insufficient to indicate a significant interaction between presentation method and sex. As shown in Table 7, respective mean attitude scores for males and females in the traditional group were 7.87 and 8.00. The scores for males

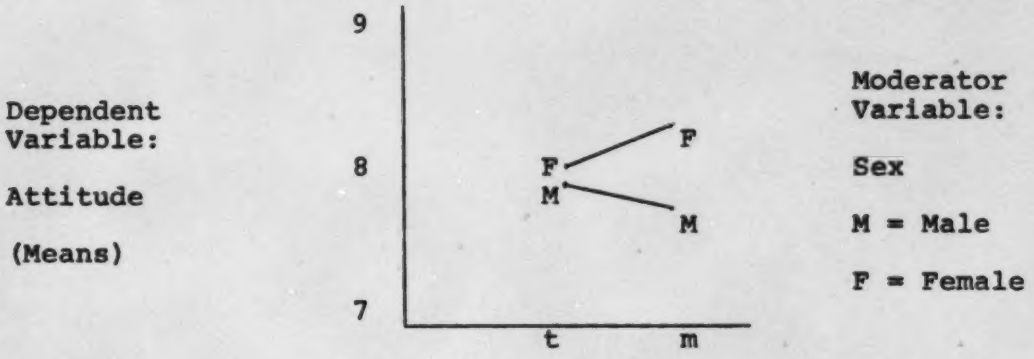

Figure 3: Interactive effects of presentation method and sex on attitude toward accounting.

and females in the multimedia group were 7.67 and 8.26. The scores are shown in graphic form in Figure 3.

(2) For the moderator variable prior knowledge of accounting, Table 8 indicates an obtained F ratio of .20 for 1 and 112 degrees of freedom. The figure was not sufficiently high to indicate a significant difference in attitude toward the course between students who had a prior knowledge of accounting and those who did not. Therefore, Hypothesis 4 could not be rejected on the basis of prior knowledge of accounting.

Table 8

Effects of Presentation Method and Prior Knowledge of Accounting on Attitude Toward Accounting--Analysis of Variance

Source	df	Mean Square	F
Presentation Method	1	0.06	0.02
Prior Knowledge of Accounting	1	0.49	0.20
Presentation x Prior Knowledge	1	0.03	0.01
Error	112	2.49	....

Table 9 shows mean attitude scores of 8.00 for students who had a prior knowledge of accounting and 7.84 for students who did not have a prior knowledge of accounting. Mean attitude scores for students with and without prior experience within each group were also presented.

Differences in attitude based on an interaction of presentation method and prior knowledge of accounting were

Table 9

Effects of Presentation Method and Prior Knowledge of Accounting on Attitude Toward Accounting-- Mean Attitude Scores

Mod. Var. Prior Knowledge	Independent Variable: Trad. Method	No.	M/Media Method	No.	Totals Both Groups	
Prior Knowledge	8.00	12	7.99	12	8.00	24
No Prior Knowledge	7.88	48	7.79	44	7.84	92
Totals	7.91	60	7.83	56	7.87	116

not significant (Table 8). The obtained F ratio of .01 for 1 and 112 degrees of freedom was insufficient to indicate a significant interaction between presentation method and prior knowledge of accounting. As shown in Table 9, respective mean attitude scores for students with and without a prior knowledge of accounting in the traditional group

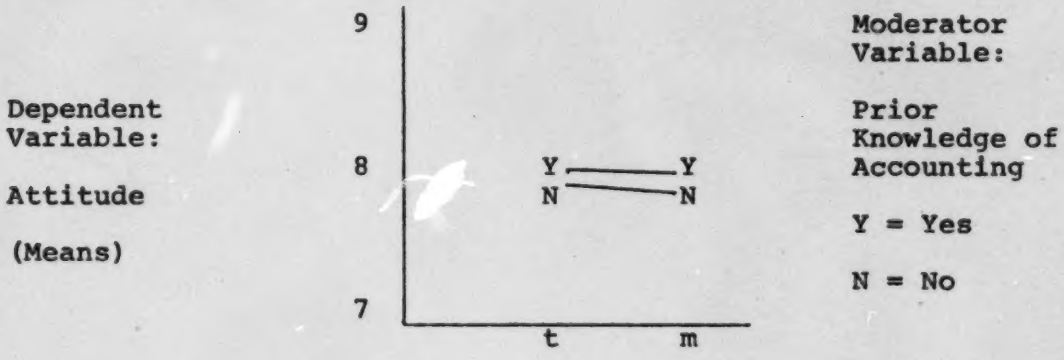

Figure 4. Interactive effects of presentation method and prior knowledge of accounting on attitude toward accounting.

were 8.00 and 7.88. The scores for students with and without a prior knowledge of accounting in the multimedia group were 7.99 and 7.79. The scores are shown in graphic form in Figure 4.

(3) For the moderator variable college major, Table 10 indicates an obtained F ratio of 1.92 for 1 and 112 degrees of freedom. The figure was not sufficiently high to indicate a significant difference in attitude toward the course between students who were Business Administration majors and students who were not Business Administration majors. Therefore, Hypothesis 4 could not be rejected on the basis of college major.

Table 10

Effects of Presentation Method and College Major on Attitude Toward Accounting--Analysis of Variance

Source	df	Mean Square	F
Presentation Method	1	2.75	1.13
College Major	1	4.67	1.92
Presentation x Major	1	4.40	1.81
Error	112	2.43	....

Table 11 shows mean attitude scores of 7.97 for students who were Business Administration majors and 7.71 for students who were not Business Administration majors. Mean attitude scores for business and nonbusiness majors within each group are also presented.

Table 11

Effects of Presentation Method and College Major on Attitude Toward Accounting--Mean Attitude Scores

Mod. Var. College Major	Independent Variable: Trad. Method	No.	M/Media Method	No.	Totals Both Groups	
Business Major	7.91	25	8.01	45	7.97	70
Nonbusiness Majors	7.90	35	7.10	11	7.71	46
Totals	7.91	60	7.83	56	7.87	116

Differences in attitude based on an interaction of presentation method and college major were not significant (Table 10). The obtained F ratio of 1.81 for 1 and 112 degrees of freedom was insufficient to indicate a significant interaction between presentation method and college major. As shown in Table 11, respective mean attitude scores for business and nonbusiness majors in the traditional group were

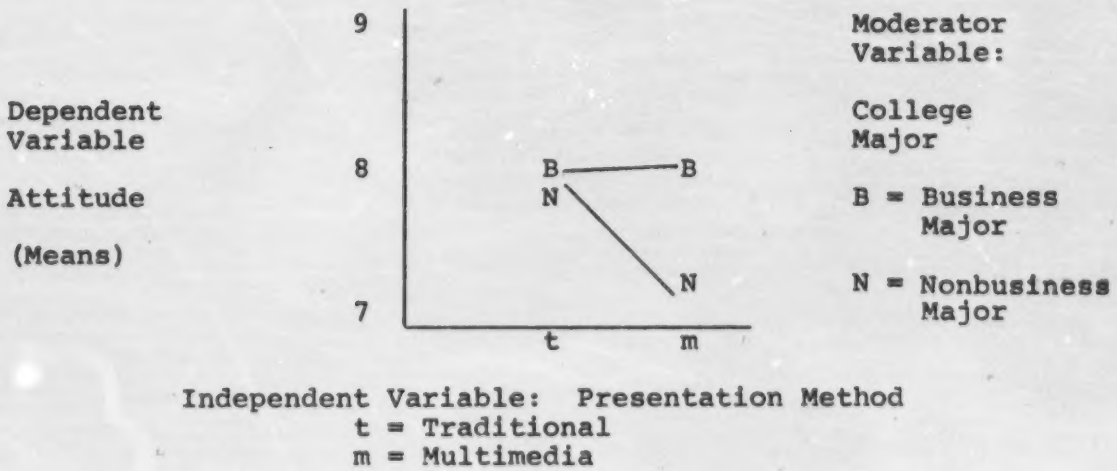

Figure 5. Interactive effects of presentation method and college major on attitude toward accounting.

7.91 and 7.70. The scores for business and nonbusiness majors in the multimedia group were 8.01 and 7.10. The scores are shown in graphic form in Figure 5. Even though nonbusiness students did more poorly with the multimedia method than might be expected, the interaction failed to reach significance.

In Summary, the analyses of variance for the moderator variables sex, prior knowledge of accounting, and college major showed none of them to be significant in affecting student attitudes toward the accounting course. Therefore, Hypothesis 4 could not be rejected.

As expressed by 56 of the 58 students in the group, the attitudes of students in the multimedia group toward the Multimedia Lab experience were favorable overall. Responses to each of the 40 items in the instrument, An Instrument for the Measurement of Expressed Attitudes Toward Multimedia Instruction, are expressed as percentages in Appendix E. Responses to selected items are shown below.

11. I felt I could work at my own pace in the Multimedia Lab.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	1.8	8.9	12.5	57.1	19.6

13. I felt as if I had a private tutor while using the audio-visuals in the Multimedia Lab.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	5.4	41.4	10.7	37.5	5.4

17. Instruction via the Multimedia Lab is an inefficient use of the student's time.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	10.7	50	25	14.3	0

26. Even otherwise interesting material would be boring when presented by Multimedia Lab instruction.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	10.7	44.6	23.2	16.1	5.4

27. In view of the effort I put into it, I was satisfied with what I learned through the Multimedia Lab instruction.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	3.6	12.5	16.1	64.3	3.6

28. In view of the amount I learned, I would say Multimedia Lab instruction is superior to traditional instruction.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	16.1	26.8	30.4	25	1.8

29. An entire course taken by Multimedia Lab instruction with help from the instructor would be superior to traditional instruction.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	14.3	37.5	16.1	28.6	3.6

30. I am not in favor of Multimedia Lab instruction because it is just another step toward depersonalized instruction.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	3.6	33.9	28.6	23.2	10.7

31. Multimedia Lab instruction is exciting and produces a better student response to the subject matter.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	7.1	32.1	28.6	30.4	1.8

32. Multimedia Lab instruction is interesting, and increases student motivation.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	7.1	30.4	25	35.7	1.8

33. Multimedia Lab instruction is O.K.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	3.6	10.7	16.1	66.1	3.6

34. I have a definite favorable reaction to the independent study in the Multimedia Lab; it's enjoyable.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	0	39.3	25	35.7	0

36. The accounting course would be better if students attended class five periods per week instead of attending four periods of classroom instruction and one period of Multimedia Lab instruction.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	19.6	44.6	10.7	21.4	3.6

40. Overall, the Multimedia Lab experience was a valuable experience.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	0	25	26.8	30.4	17.9

It is interesting to note that responses to many of the items were bimodal with the majority opinion being split between "agree" and "disagree." It would seem that half of the students truly liked the multimedia approach while half did not.

DISCUSSION

Findings and Conclusions

The findings and conclusions of this study were as follows:

1. There was no difference in academic achievement between students who were taught the accounting cycle by a multimedia approach and students who were taught by the traditional approach. It was concluded that both methods were equally effective.
2. Mental ability was a significant determinant of academic achievement on the accounting cycle, but interaction of mental ability and either presentation method was not significant.
3. There was no difference in attitude toward the accounting course between students who were taught the accounting cycle by a multimedia approach and students who were taught by the traditional approach.
4. Student attitudes toward the course were not affected by sex, prior knowledge of accounting, or college major.

Interpretations

In order to measure achievement as accurately as possible from both the factual and procedural points of view, this study utilized two posttests measuring achievement on the accounting cycle. (The two tests had a correlation of .69)

Both tests showed the same achievement results for (1) presentation method and (2) presentation method x mental ability.

In analyzing the data, an analysis of covariance was completed twice--once with and once without AICPA pretest scores to be sure that covarying AICPA scores for verbal-reading ability and math ability did not cancel out any effect of mental ability scores (i.e., the moderator variable) as measured by the Otis Quick-Scoring Mental Ability Test. The AICPA Orientation Test is "essentially a measure of intelligence slanted toward business" (AICPA Testing Project Office). The results were essentially the same for both analyses indicating that the two tests did not "interfere" with each other statistically.

There is much conflicting evidence from studies involving multimedia instruction and personalized instruction as compared to the traditional method of instruction. Some studies have favored the alternate approaches to instruction, and some have concluded that there is no significant difference as far as achievement is concerned. Concerning attitude toward the instructional approach, some studies have favored the alternate approaches, and some studies have shown no significant difference. The results are the same when attrition rates for different instructional approaches are studied. No studies were found favoring the traditional approach over the alternate approaches as far as achievement, attitude toward the instructional approach, and attrition are concerned although it is quite possible that such findings

exist. Finally, some findings show students to favor the alternate approaches, but want them modified so that the lecture-discussion method is not completely removed from the instructional procedure.

The multimedia approach used in this study attempted to combine the advantages of various presentation methods, the use of audio-visual materials, and a small amount of individualized study. Thus, four classroom lecture periods, one Multimedia Lab period, and the use of audio-visual materials in both settings were used. The instruction was primarily teacher-centered since it was felt that all resources and innovations center around the teacher.

The classroom sessions provided the structure that many junior college students depend on in the learning situation. Jioia (1973) reports that students felt a free environment was detrimental to their learning because it afforded them too much time which tended to make them procrastinate. Speer (1972) feels that the student of average ability apparently depends heavily on the structure provided by the lecture method and does not fare well when that structure is removed.

The Multimedia Lab experience gave the student a small amount of independent study through which he could make use of learning resources other than the textbook in a setting outside the classroom. The experience enabled the student to be an active participant in the learning situation so that he could learn more and retain it longer (Postlethwait,

1974, p. 201; Roueche, 1973, p. 25; Sherman, 1974, p. vii; Gulliford, 1973, p. 59).

One possible reason for the outcome of no significant difference when teaching the accounting cycle by the multimedia approach as compared to the traditional approach is that the two approaches were too similar to have produced a difference in achievement or attitude. The traditional approach made use of the lecture-discussion method for five periods per week as the main thrust of presenting the material to the students. The multimedia approach also used the lecture-discussion method, but did so for only four periods per week and incorporated audio-visual materials into the instructor's lectures. In addition, it made use of individualized study (based on the same audio-visual materials used in the classroom) for approximately one period per week. The basic difference, then, between the two instructional approaches was the introduction of audio-visual materials to the multimedia method of presentation--both in the classroom and through individualized study in the Multimedia Lab. It is possible that the multimedia approach as it was devised for and used in the study was too similar to the traditional approach to cause a significant difference as hypothesized. Modifications to the multimedia method of presentation could possibly produce different results.

Studies have frequently shown no significant difference in achievement when comparing the traditional form with alternate forms of instructional presentation. However, other

benefits of alternate approaches to teaching have been found to exist. For example, less study time and better application of learning (Elliott & Tuckman, Note 1) and more efficient use of teacher time (Phillips & Utz, 1973) have been found to be "fringe" benefits of alternate instructional approaches to teaching.

Multimedia Features and Applications

Although this study showed no significant difference between the traditional approach and a multimedia approach to teaching the accounting cycle, there were some fringe benefits attached to the multimedia approach as it was used. The accounting class met four periods per week instead of the usual five periods per week. In lieu of the fifth classroom period, the students spent their time studying independently at their convenience in the Multimedia Lab. Achievement and attitude toward the course were not adversely affected by the decreased number of formal class meetings.

In this experiment, the four-one breakdown of instructional time described above intentionally kept the amount of school time spent studying accounting approximately equal for both the traditional group and the multimedia group. Students in the multimedia group were not allowed to study any of the ten lessons in the Multimedia Lab more than once as another means of control.

In a nonexperimental situation, which would be free of time restrictions, classes could meet four periods per week

with the fifth scheduled period used for tutorial purposes. Students could attend the fifth class on a voluntary basis to get additional help from the instructor. Also, students would, of course, have unlimited used of the Multimedia Lab. The result would be four periods of classroom instruction, use of the Multimedia Lab as desired, and a "built-in" tutorial period for those who want or need it. Since accounting would be scheduled for five periods per week, there would be a good chance that students would take advantage of the tutorial period because they are not scheduled for anything else in that time block. The tutorial period would augment and improve the system of using faculty office hours for tutorial work. Conflicts between faculty office hours and students' scheduled classes frequently discourage students from seeking additional help from instructors. The tutorial period and the unrestricted use of the Multimedia Lab could not help but improve the learning situation over the learning situation as it was devised for the experimental study.

The multimedia approach also gives the student more active participation in the learning process, requires him to assume a certain amount of responsibility for learning, and allows him to use the Multimedia Lab when he desires, as often as he desires, for as long as he desires. The Multimedia Lab offers a change from the repetition of the lecture approach, enables the student to review difficult points, make up classes he has missed, or work ahead if he desires. In

addition, it is possible for a student to borrow materials for home study just as he borrows books from a library.

Individual Differences

In comparing posttest adjusted means for The Accounting Cycle Test (recognition type) for low, medium, and high mental ability levels, it was found that students of low and medium mental ability levels achieved slightly higher means when taught by the multimedia approach. The adjusted mean of students of high mental ability, however, was slightly lower than the mean of their counterparts who experienced traditional instruction.

For The Accounting Cycle Procedures Test (recall type), only the students in the low mental ability level achieved a higher posttest mean when taught by the multimedia approach. Students of medium and high mental ability levels had posttest means slightly lower than their counterparts who experienced traditional instruction. In all cases, the differences were small enough, however, to be insignificant.

Even though there was no significant difference in achievement between the two groups receiving different instructional strategies in this particular study, there may be implications for significantly greater achievement for students of low mental ability when taught by the multimedia approach. Students of low mental ability (81 to 101 in this study) who were taught the accounting cycle by the multimedia approach comprised the only mental ability group to score

higher than their counterparts taught by the traditional approach on both posttest achievement measures. Under circumstances where the restrictions for experimental control used in this study are removed, it is possible that the benefits of the tutorial period and the unlimited use of the Multimedia Laboratory could account for a significant difference in achievement. Based on the achievement by mental ability levels in this study, it seems logical to expect that students of low mental ability would be the likely beneficiaries. The results of Onah's study (1971)--that low aptitude students performed better with an Audio-Visual-Tutorial system than with the traditional system when it allowed them to spread their time and work at their own pace--tends to lend some support to the theory. Onah measured "aptitude" by the AICPA Orientation test which is essentially an intelligence test slanted toward business.

Because this study concerned itself with achievement on the accounting cycle, the duration of the experiment was only several weeks, and course attrition rates could not be measured. However, it may be possible that a multimedia approach utilizing four class periods per week, one tutorial period per week, and the Multimedia Laboratory experience at the students' convenience could reduce the attrition rate when used for the entire accounting course. The benefits of the Lab experience and the tutorial period could possibly improve learning enough to reduce frustration

and cause fewer students to withdraw from the course. Those most likely to benefit from the above-mentioned multimedia strategy, if anybody, are students in the low mental ability range. Since this study showed the low mental ability students to benefit most from a multimedia approach which did not include a tutorial period and unlimited use of the Multimedia Lab, an approach in which they are included might salvage more of the low mental ability students with a resulting decrease in attrition.

Attitudes

The results of the "Remmers Scale" showed that there was no significant difference in attitude toward the course between the two groups. However, within the multimedia group, students who completed the questionnaire on the Multimedia Lab experience expressed a preference for the multimedia approach as compared to the traditional approach. Item No. 36 of the questionnaire read as follows:

> The accounting course would be better if students attended class five periods per week instead of attending four periods of classroom instruction and one period of Multimedia Lab instruction.

The responses to the above item indicated that 64.2% of the students disagreed with the statement, 25% agreed, and 10.7% were uncertain.

Two things should be kept in mind regarding the above responses: (1) students in the multimedia group responded to the statement without ever experiencing accounting instruction for five periods per week because the experiment was started

during the first week of classes; (2) there is no way of knowing the students' true meaning behind their responses. Did the students express a preference for the multimedia arrangement because they truly felt it was a better way to learn, or was it because the arrangement simply meant one less formal class to attend per week, thereby making the students happy?

In either case, the responses indicated that the majority of the students in the multimedia group favored the different approach to learning even though their overall attitudes toward the course did not differ significantly from the attitudes of students in the traditional group.

Overall, attitude toward the Multimedia Lab experience was favorable as indicated by the responses to Item No. 40: "Overall, the Multimedia Lab experience was a valuable experience." The results showed that 48.3% agreed with the statement, 25% disagreed, and 26.8% were uncertain. However, students' responses to specific items regarding the value of the Multimedia Lab experience indicated that feelings were not strong ones. For example, Item No. 31, "Multimedia Lab instruction is exciting and produces a better student response to the subject matter," drew 32% agreement and 39% disagreement. Item No. 32, "Multimedia Lab instruction is interesting, and increases student motivation," drew 38% agreement and 38% disagreement. Item No. 34, "I have a definite favorable reaction to the independent study in the Multimedia Lab; its enjoyable," drew 36% agreement

and 39% diagreement. Item No. 33, "Multimedia Lab instruction is O. K.," which was a less intense statement drew 69.7% agreement and only 14% disagreement. The above results tend to explain why students reacted unfavorably to item No. 29, "An entire course taken by Multimedia Lab instruction with help from the instructor would be superior to traditional instruction." Only 32% of the students agreed with the statement; 52% disagreed.

The results indicated that although students held attitudes which were favorable overall toward the Multimedia Lab instruction, they were not in favor of the complete replacement of the traditional approach with a multimedia approach for the accounting course.

Limitations

It should be kept in mind that the attitudes toward the course as expressed on the Remmers Scale were based on an experimental study of short duration. It is possible that the expressed attitudes toward the course could differ for either presentation method in a study spanning a full semester of instruction. Another point that should be kept in mind is that even though many students in the multimedia group completed only a portion of the ten lessons in the Multimedia Lab, they still responded to all items on the questionnaire regarding the Multimedia Lab experience. As a result, students were responding to the questionnaire based on incomplete exposure to the Lab experience.

One of the limitations of this study, as with any field study, was the fact that it was impossible to control every variable. Student responsibility for the individualized portion of instruction was a case in point. Students in the multimedia group were given full explanation of and orientation to the Multimedia Laboratory. The Lab was available from 8:00 a.m. to 4:00 p.m. five days per week so as to accomodate all students in the group. Ad hoc analysis of attendance records, however, showed that even with the possible extrinsic motivation provided by a test on the material used in the Multimedia Lab, students studied an average of only 6.6 of the ten lessons that were supposed to be studied. A total of 34.3% of the students studied not more than half of the ten lessons. Details regarding the amount in individualized study in the Multimedia Lab are shown in Table 12.

Students recorded the amount of time spent on each lesson on their Lab attendance cards. Some of the entries indicated that lessons in some cases might have been hastily completed.

The Multimedia Lab attendance problem is what Connolly and Sepe (1973) referred to when they reported that student responsibility for learning is a vital ingredient for success in individualized instruction and that student willingness to assume responsibility for learning is apparently lacking in many students.

Because of the outcome of the ad hoc analysis of Multimedia Lab attendance records, a further analysis was undertaken

Table 12

Student Acceptance of Responsibility for Individualized Study in the Multimedia Laboratory

No. of Lessons Completed[a]	Number of Students	Percent of Students
0	2	3.4
1	3	5.2
2	5	8.6
3	2	3.4
4	2	3.4
5	6	10.3
6	8	13.8
7	4	6.9
8	4	6.9
9	6	10.3
10	16	27.6

[a]Average number of lessons completed equals 6.6.

of the attendance of males and females. It was found that females tended to assume more responsibility for the individualized study than did males. The data for 15 females showed 8.1 as the mean number of lessons completed and a variance of 9.4. Data for 43 males showed 6.0 as the mean number of lessons completed and a variance of 9.3. A t-test yielded a value of 2.3 for 56 degrees of freedom which was significant beyond the .05 level of confidence. The results are shown in Table 13.

In summary, there was no significant difference in achievement or attitude toward the accounting course between the traditional group and the multimedia group. Students in the multimedia group indicated (1) a satisfactory attitude toward the multimedia approach to learning the accounting

Table 13

A Comparison of the Number of Lessons Completed by Males and Females in the Multimedia Laboratory

Group	Number	Variance	Means	t
Males	43	9.3	6.0	2.3*
Females	15	9.4	8.1	

*$p < .05$

cycle, (2) a preference for the multimedia arrangement of four periods of lecture-lab and one period of individualized instruction in the Multimedia Lab as compared to the traditional arrangement of five periods of lecture-lab and (3) a 2:1 favorable reaction to the Multimedia Lab experience being a valuable experience overall.

On the basis of the findings of the study, it was concluded that the multimedia approach was a potentially preferred approach for teaching the accounting cycle in the eyes of many students.

Recommendations for Implementation

1. The multimedia approach used to teach the accounting cycle in this study should be implemented to teach the introductory accounting course at Rhode Island Junior College.

a. A complete instructional package consisting of cassette tapes and filmstrips, and/or video tapes should be purchased and/or developed for individualized instruction. Since "there is no demonstrated superiority for any one form of media in an independent study format" (Gulliford,

1973, p. 42), convenience of use, adaptability, and potential for maximum use should be factors considered in selecting the media to be used.

b. If audio-visual materials must be introduced gradually, materials dealing with the most difficult parts of the course should be introduced first.

c. The audio-visual materials for independent study should be located in the Multimedia Laboratory or the library. In either case, students should be given the opportunity to borrow audio-visual materials for home study.

d. Accounting should continue to be scheduled five periods per week. The instructional format should include four lecture-lab periods and one tutorial period. The tutorial period should be supervised by the instructor, and student attendance should be voluntary. Independent study should be done at the convenience of the student.

e. When the multimedia approach is implemented, adequate orientation should be given to students regarding individualized learning. Most students will have had about 12 years of structured learning and many will not be able to fully cope with any form of individualized learning.

Recommendations for Further Study

1. A similar study spanning a full semester of accounting instruction should be conducted. Variables to be studied should include achievement, attitude, attendance, and attrition.

2. A similar study comparing a traditional approach and a multimedia approach exactly as they would be used in a non-experimental situation should be conducted to determine whether the multimedia approach with its potential fringe benefits has a significant impact on student achievement, attitude, attrition, and attendance. The term fringe benefits is meant to mean the use of one of the five scheduled periods per week as a tutorial period and unlimited student use of the audio-visual materials available in the Multimedia Lab; that is, using a lesson as often as desired and borrowing lessons for home study.

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APPENDIX A

THE ACCOUNTING CYCLE TEST

DIRECTIONS: Mark the letter indicating the correct response on the answer sheet. Use pencil only. If you change an answer, erase the mark on the answer sheet thoroughly.

1. A device used in accounting to accumulate information is called a/an

   a) debit
   b) account
   c) credit
   d) none of the above

2. A chart of accounts is really an index to the

   a) journal
   b) ledger
   c) worksheet
   d) none of the above

3. An asset account will normally increase when you place an amount on its _____ side.

   a) debit
   b) credit

4. A liability account will normally decrease when you place an amount on its _____ side.

   a) debit
   b) credit

5. A capital account will normally increase when you place an amount on its _____ side.

   a) debit
   b) credit

6. An expense account will normally increase when you place an amount on its _____ side.

   a) debit
   b) credit

7. An income account will normally increase when you place an amount on its _____ side.

   a) debit
   b) credit

8. The beginning balance of supplies is $400. The ending balance is $250. The amount of the adjusting entry should be

   a) $400
   b) $250
   c) $650
   d) $150
   e) none of these

9. An amount placed on the debit side of the drawing account

   a) increases the assets
   b) decreases the capital
   c) has no effect on the assets
   d) increases the capital

10. When doing a worksheet, the balance of the Prepaid Rent account should be extended to

a) the balance sheet
b) the income statement
c) neither of these

11. A statement of a company's financial position as of a certain date is the

a) Income Statement
b) Balance Sheet
c) Capital Statement
d) Statement of Retained Earnings

12. If accrued taxes of $1,000 were omitted from the income statement by mistake, the net income for the period would be

a) overstated by $1,000
b) understated by $1,000
c) not affected

13. A capital statement reveals a beginning balance of $30,000, an additional investment of $10,000, net income of $18,000, and owner's withdrawals of $6,000. The capital balance at the end of the period is

a) $42,000
b) $52,000
c) $58,000
d) $48,000
e) none of these

14. After the post-closing trial balance is completed, the only accounts which should have balances are the

a) real accounts
b) nominal accounts
c) neither of these

15. Credits to an income account may be considered as

a) decreases to capital
b) increases to capital
c) having no affect on capital

16. If your assets were 5 and your liabilities were 3, your capital would be

a) 8
b) 3
c) 15
d) none of these

17. The net income reported on the income statement of a sole proprietorship for the period is $18,500. Later it is discovered that adjusting entries were not made at the end of the period for accured wages of $400 and expired insurance of $720. Net income, as corrected, is

a) $19,620
b) $18,180
c) $17,380
d) $17,780
e) none of these

18. If the errors in the previous question are not corrected, the effect on the balance sheet will be as follows: Capital will be

a) overstated by $1,120
b) understated by $1,120
c) overstated by $320
d) understated by $320
e) unaffected by the errors

19. The adjusting entry for taxes accrued at the end of the period is

a) Taxes Payable
Cash

b) Taxes Expense
Cash

c) Taxes Expense
Taxes Payable

d) Taxes Payable
Taxes Expense

e) none of these

20. The general term applied to the group of accounts that is closed at the end of the accounting period is

a) real accounts
b) nominal accounts
c) mixed accounts
d) none of these

21. An account with a balance composed in part of a balance sheet amount and in part of an income statement amount is called a

a) contra account
b) mixed account
c) temporary account
d) none of these

22. If the debit portion of a $350 journal entry is erroneously posted to the ledger as a credit (no other errors), the trial balance totals will differ by

a) $350
b) $0.00
c) $700
d) $175
e) none of these

23. The capital account of a sole proprietorship has a credit balance of $40,000 before the accounts are closed. The balance of the drawing account is $15,000 at the end of the year, and the net income for the year is $20,500. After closing the accounts, the capital account will have a balance of

a) $44,500
b) $4,500
c) $75,500
d) $45,500
e) none of these

24. The cost of a newspaper ad was debited to Utilities Expense and credited to Cash when payment was made. The entry to correct the above error is

a) Advertising Expense
Utilities Expense

b) Advertising Expense
Cash

c) Cash
Advertising Expense

d) Utilities Expense
Cash

e) none of these

25. The entry to close the Rent Expense account is

a) Rent Expense
Income Summary

b) Rent Expense
Capital

c) Income Summary
Rent Expense

d) none of these

26. The term Owner's Equity means the same as

a) Assets
b) Liabilities
c) Capital
d) None of these

27. Costs that have been consumed in the process of producing revenue are

a) assets
b) liabilities
c) revenues
d) expenses
e) none of these

28. The normal balance of the drawing account is on the same side as the normal balance of

a) a liability account
b) an income account
c) a capital account
d) an expense account

29. Accounts receivable is an example of

a) a current liability account
b) an income account
c) a current asset account
d) none of these

30. To find out what a person is worth you would use the formula

a) A - L = C
b) A + L = C
c) C = A x L
d) none of these

31. The balance in the Prepaid Insurance account before adjustment at the end of the period is $1,180. The amount of expired premiums at the end of the period is $380. The amount of the adjusting entry should be

a) $800
b) $1,560
c) $380
d) none of these

32. Which one of the following is <u>not</u> a nominal account?

a) Rent Expense
b) Cash
c) Rent Income
d) none are nominal accounts
e) all are nominal accounts

33. The adjusting entry to record depreciation for the period is

a) Depreciation Expense
Accumulated Depreciation

b) Accumulated Depreciation
Depreciation Expense

c) Income Summary
Depreciation Expense

d) Depreciation Expense
Income Summary

e) none of these

34. The entry to close the Sales account is

a) Income Summary
Sales

b) Sales Expense
Income Summary

c) Sales
Income Summary

d) none of these

35. The entry to close the Drawing account is

a) Drawing
Capital

b) Capital
Drawing

c) Drawing
Drawing Expense

d) none of these

In the next seven questions, assume that you are the accountant for Mr. Dan Blockhead who is an architect.

Blockhead tells you he just paid $4,000 in cash for a new Xerox machine for copying blueprints.

36. In the above transaction which account should be debited?

a) Blockhead's capital
b) Cash
c) Equipment
d) none of the above

37. In the above transaction which account should be credited?

a) Cash
b) Equipment
c) Blockhead's capital
d) none of the above

38. In the above transaction the accounts involved were

a) both liability accounts
b) both asset accounts
c) one asset account and one liability account
d) one asset account and one capital account.

39. As a result of the above transaction, Blockhead's capital was

a) increased
b) decreased
c) not affected

Blockhead draws up a set of plans for Mr. Homeless and he receives $100 for his work.

40. What accounts are involved in this transaction?

a) Cash and Fees Income
b) Cash and Fees Expense
c) Cash and Accounts Payable
d) none of the above

41. What account should be debited in this transaction?

a) Accounts Payable
b) Fees Income
c) Cash
d) none of the above

42. What account should be credited in this transaction?

a) Accounts Payable
b) Cash
c) Fees Income
d) none of the above

43. When doing a worksheet, the balance of the Salary Expense account should be extended to

a) the balance sheet
b) the income statement
c) neither of these

44. The beginning balance of Prepaid Insurance is $600. The amount of insurance premiums expired during the year is $450. The amount of the adjusting entry is

a) $600
b) $450
c) $1,050
d) $150
e) none of these

45. If the trial balance is equal, you may be sure that

a) your work is 100% correct
b) the assets and the liabilities are equal
c) the liabilities and the capital are equal
d) the debits and credits are equal
e) the journal entries are correct

Dr. Headstrong treats a Mrs. Pain and bills her for $15. Answer the following three questions pertaining to Dr. Headstrong's books.

46. What accounts are involved in the transaction?

a) Cash and Accounts Receivable
b) Cash and Fees Income
c) Accounts Receivable and Fees Income
d) none of these

47. What account should be debited in the transaction?

a) Accounts Receivable
b) Cash
c) Fees Income
d) none of these

48. What account should be credited in this transaction.

a) Cash
b) Accounts Receivable
c) Fees Income
d) none of these

49. The last step in the posting procedure is

a) recording the date of the transaction in the ledger
b) recording the posting reference number in the journal
c) recording the amount of the transaction in the ledger
d) none of these

50. A trial balance that is out of balance by $27.00 most likely indicates an error of

a) addition
b) subtraction
c) multiplication
d) transposition

51. The entry to close the Income Summary account when there is a net profit is

a) Income Summary
  Capital

b) Income Summary
  Revenue

c) Capital
  Income Summary

d) Drawing
  Capital

e) none of these

52. Which of the following is <u>not</u> a capital account?

a) Capital Stock
b) Retained Earnings
c) Income Summary
d) Drawing
e) none of these

53. The subtotals of the income statement columns of the worksheet are $210,000 (debit) and $190,000 (credit). The business has

a) a $20,000 net loss
b) a $20,000 net income
c) a $400,000 gain
d) none of these

54. If a business shows net income for the period, the capital of the business will

a) increase
b) decrease
c) remain the same
d) none of these

55. Which best describes dividends?

a) a deficit
b) a decrease to capital stock
c) a distribution of corporate earnings
d) withdrawals by a sole proprietor
e) the amount of a corporation's retained earnings

APPENDIX B

The Accounting Cycle
Procedures Test

Part I

Directions: As bookkeeper for the Carter Insurance Agency, complete the following:

1. Record the business transactions given in a two-column general journal. Use the account titles given in the ledger.
2. Post the journal entries to the ledger.
3. Take a trial balance as of June 30. 19XX.

Business Transactions

June 1 Paid rent for the month of June, $150.
8 Received $1,600 in commissions for policies sold.
15 Purchased $50 worth of office supplies on account.
24 Paid $600 to a creditor.
29 Paid the month's utility bills, $300.
30 Carter withdrew $100 for personal use.

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Date	Description	PR	Debit	Credit

GENERAL LEDGER

Cash 11

Bal. 1,000

Acct. Receivable 12

Bal. 700

Office Supplies 13

Bal. 30

Office. Equip. 14

Bal. 3,000

Acct. Payable 21

900 Bal.

James Carter, Cap. 31

3,830 Bal.

James Carter, Draw. 32

Commissions Inc. 41

Rent Expense 51

Miscellaneous Exp. 52

Cash																							
Accounts Receivable																							
Office Supplies																							
Office Equipment																							
Accounts Payable																							
John Carter, Capital																							
John Carter, Drawing																							
Commissions Income																							
Rent Expense																							
Miscellaneous Expense																							

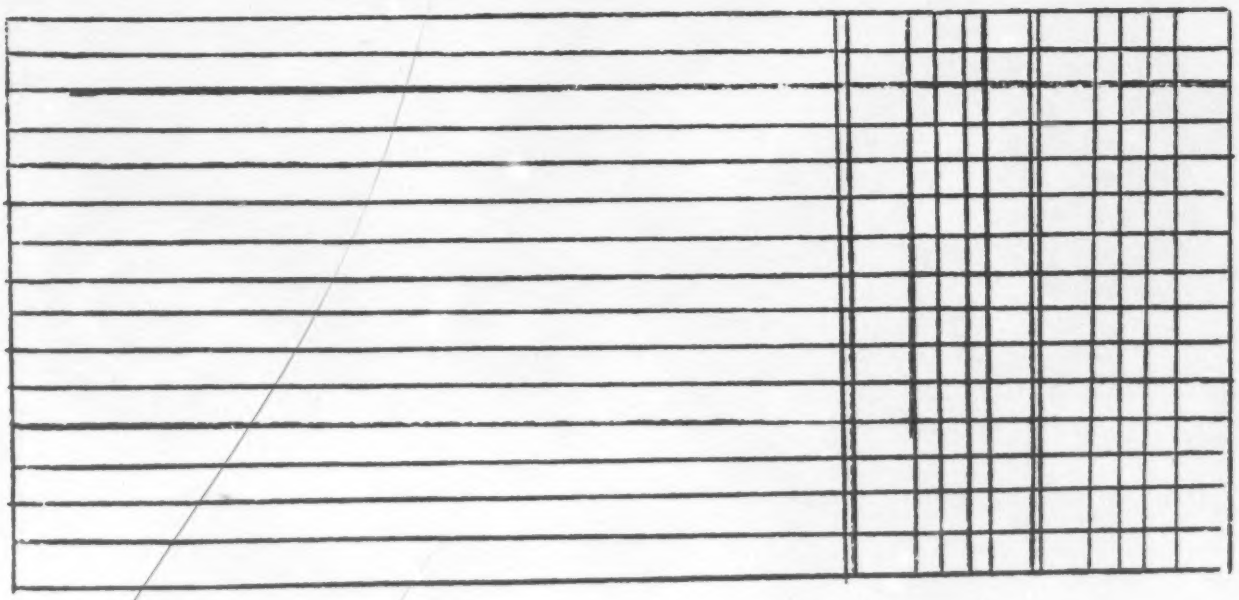
Part II

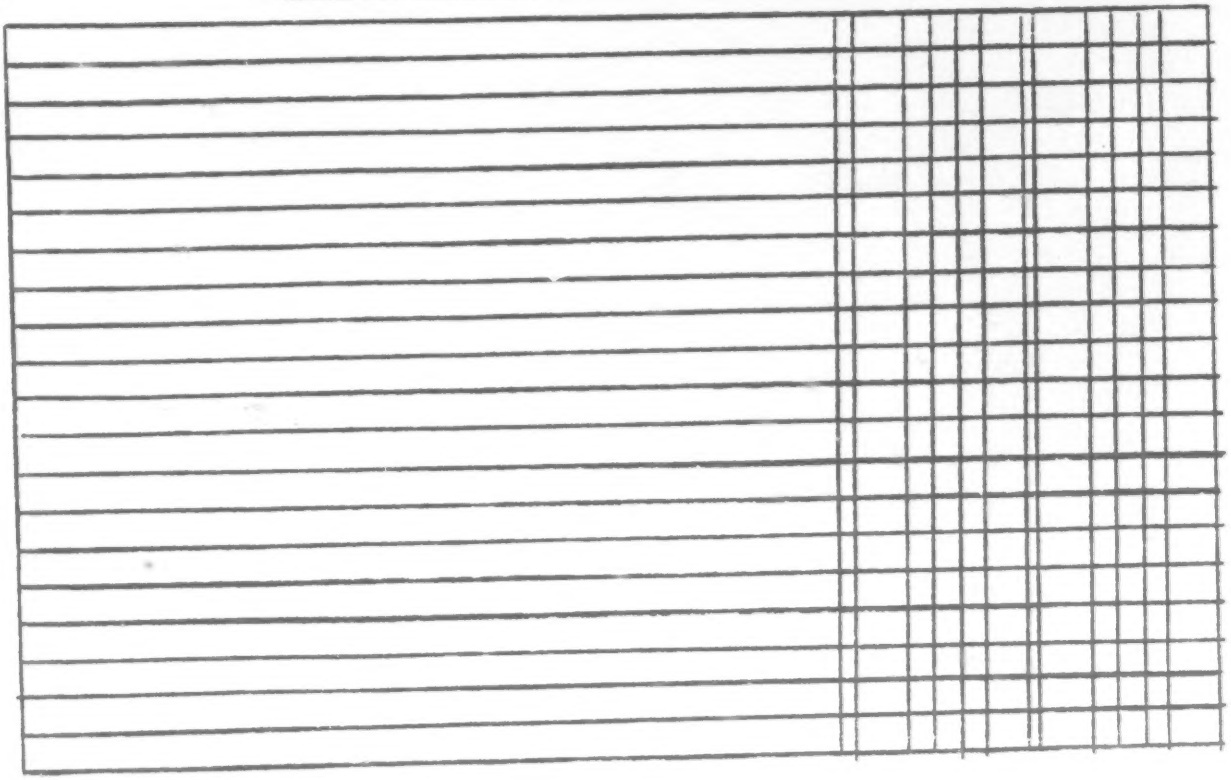
Directions: The worksheet for Modern Cleansers is shown below. Based on the worksheet, complete the following:

1. Prepare an income statement for the month.
2. Prepare a balance sheet in report form.
3. Record the closing entries in a two-column general journal.

Modern Cleansers
Worksheet
For the Month Ended October 31, 19XX

Account Titles	Trial Balance		Adjustments		Income Statement		Balance Sheet	
Cash	3200						3200	
Accounts Receivable	200						200	
Supplies	50			a) 15			35	
Equipment	3850						3850	
Accumulated Deprec.--Equip.		500		b) 250				750
Accounts Payable		300						300
Roger Johnson, Capital		6000						6000
Roger Johnson, Drawing	200						200	
Sales		3000				3000		
Wages Expense	1600				1600			
Rent Expense	700				700			
	9800	9800						
Supplies Expense			a) 15		15			
Depreciation Expense--Equip.			b) 250		250			
			265	265	2565	3000	7485	7050
Net Income					435			435
					3000	3000	7485	7485





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Date	Description	PR	Debit	Credit

APPENDIX C

The Accounting Cycle
Procedures Test

Part I

Directions: As bookkeeper for the Apex Realty Company, complete the following:

1. Record the business transactions given in a two column general journal. Use the account titles given in the ledger.
2. Post the journal entries to the ledger.
3. Take a trial balance as of June 30, 19XX.

Business Transactions

June 1 Paid rent for the month of June, $200.
8 Received $2,300 as commission for property sold.
15 Purchased $100 worth of office equipment for cash.
24 Received $400 on account from a client.
29 Received the month's electric bill, $400. The bill will be paid next month.
30 Carter withdrew $200 for personal use.

JOURNAL Page 5

Date	Description	PR	Debit	Credit

Cash 11

Bal. 1,000

Acct. Receivable 12

Bal. 700

Office Supplies 13

Bal. 30

Office. Equip. 14

Bal. 3,000

Acct. Payable 21

900 Bal.

James Carter, Cap. 31

3,830 Bal.

James Carter, Draw. 32

Commissions Inc. 41

Rent Expense 51

Miscellaneous Exp. 52

Cash		
Accounts Receivable		
Office Supplies		
Office Equipment		
Accounts Payable		
John Carter, Capital		
John Carter, Drawing		
Commissions Income		
Rent Expense		
Miscellaneous Expense		

Part II

Directions: The worksheet for Modern Cleansers is shown below. Based on the worksheet, complete the following:

1. Prepare an income statement for the month.
2. Prepare a balance sheet in report form.
3. Record the closing entries in a two-column general journal.

Modern Cleansers
Worksheet
For the Month Ended October 31, 19XX

Account Titles	Trial Balance		Adjustments		Income Statement		Balance Sheet	
Cash	1,200						1,200	
Accounts Receivable	200						200	
Equipment	5,000						5,000	
Building	13,850						13,850	
Accumulated Deprec.--Bldg.		300		b)300				600
Accounts Payable		450						450
Roger Johnson, Capital		19,000						19,000
Roger Johnson, Drawing	200						200	
Sales		3,000				3,000		
Wages Expense	1,600		a) 85		1,685			
Utilities Expense	700				700			
	22,750	22,750						
Wages Payable				a) 85				85
Depreciation Expense--Bldg.			b)300		300			
			385	385	2,685	3,000	20,450	20,135
Net Income					315			315
					3,000	3,000	20,450	20,450

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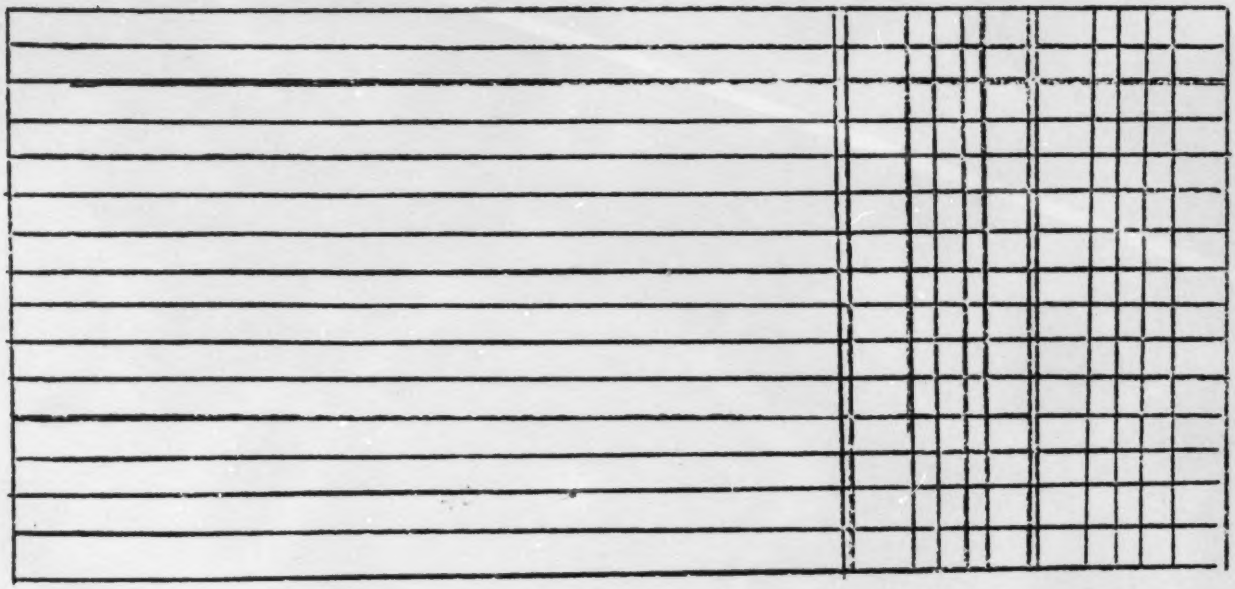

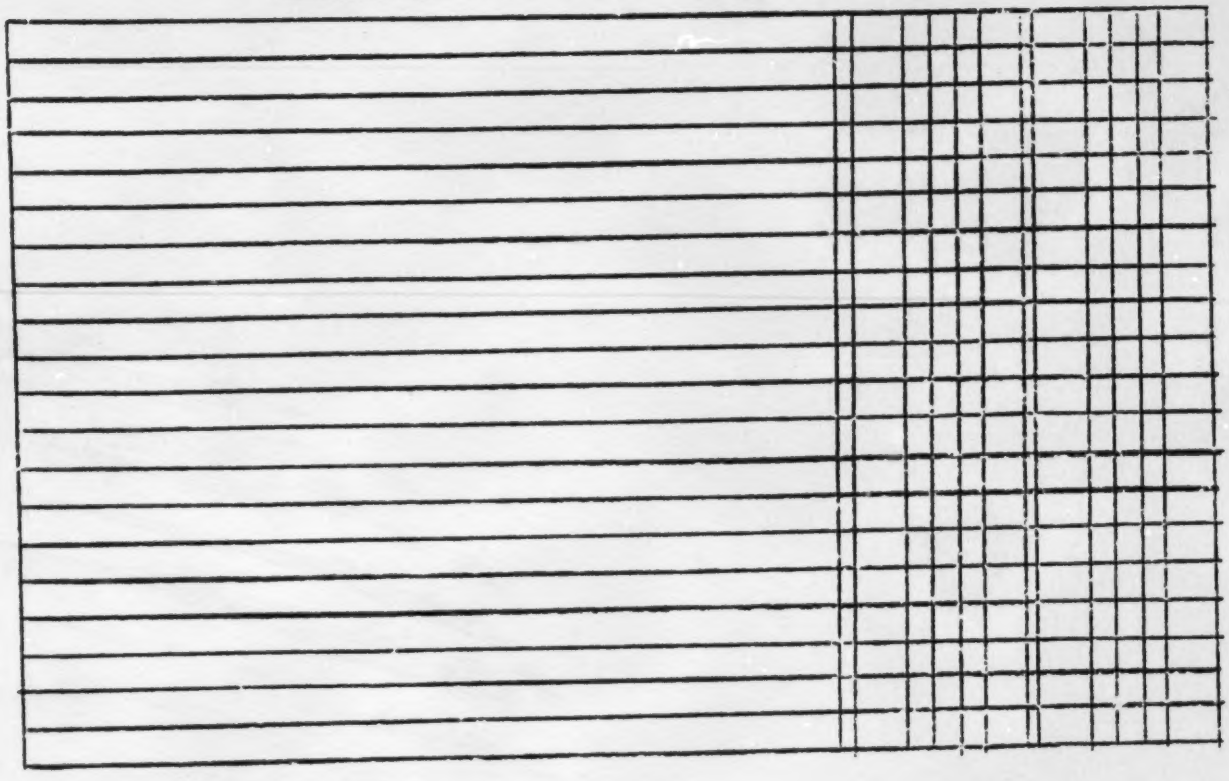

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Date	Description	PR	Debit	Credit

APPENDIX D

A SCALE FOR MEASURING ATTITUDE TOWARD ANY SCHOOL SUBJECT

ATTITUDE SURVEY

DIRECTIONS: Do not write your name on this paper. Following is a list of statements about the course. Place an A before each statement with which you agree, and a D before each statement which which you disagree. Please be candid.

Sex: Male_____ Female_____

Have you had a complete course in bookkeeping or accounting before?

Yes_____ No_____

Are you a Business Administration major? Yes___ No___

*0.6	1.	I hate this course.
0.7	2.	This course is the most undesirable course taught.
0.8	3.	I detest this course.
1.0	4.	I look forward to this course with horror.
1.3	5.	This course is disliked by all students.
1.5	6.	It is a punishment for anybody to take this course.
1.6	7.	This course is a waste of time.
2.1	8.	This course is based on "foggy" ideas.
2.2	9.	I would not advise anyone to take this course.
2.4	10.	I have seen no value in this course.
2.5	11.	I have no desire for this course.
2.6	12.	This course reminds me of Shakespeare's play--"Much Ado About Nothing."
2.8	13.	This course is very dry.
2.9	14.	This course does not teach you to think.
3.1	15.	I am not interested in this course.
3.3	16.	The minds of students are not kept active in this course.

*Point values do not appear on respondent's copy.

3.4	17.	Mediocre students never take this course so it should be eliminated from schools.
3.5	18.	I could do very well without this course.
3.6	19.	My parents never had this course, so I see no merit in it.
4.7	20.	This course will benefit only the brighter students.
5.5	21.	I haven't any definite like or dislike for this course.
5.8	22.	I am careless in my attitude toward this course, but I would not like to see this attitude become general.
6.1	23.	I don't believe this course will do anybody any harm.
6.5	24.	This course is a good pastime.
6.8	25.	This course is not a bore.
7.3	26.	This course saves time.
7.6	27.	This course is not receiving its due in schools.
7.7	28.	I am willing to spend my time studying this course.
7.9	29.	This course is O.K.
8.1	30.	All lessons and all methods used in this course are clear and definite.
8.3	31.	This course is a cultural subject.
8.4	32.	This course is a good course.
8.5	33.	All of our great men studied this course.
8.7	34.	This course is a universal course.
8.8	35.	This course teaches me to be accurate.
8.9	36.	Any student who takes this course is bound to be benefited.
9.0	37.	This course is very practical.
9.1	38.	This course develops good reasoning ability.
9.2	39.	This course is profitable to everybody who takes it.

9.4 40. I really enjoy this course.

9.6 41. This course has an irresistable attraction for me.

9.7 42. This course is of great value.

9.8 43. I love to study this course.

10.2 44. I would rather study this course than eat.

10.3 45. No matter what happens, this course always comes first.

APPENDIX E

AN INSTRUMENT FOR THE MEASUREMENT OF EXPRESSED ATTITUDES TOWARD MULTIMEDIA INSTRUCTION

QUESTIONNAIRE

This is not a test of information; therefore, there is no one "right" answer to a question. We are interested in your opinion on each of the statements below. Your opinions will be strictly confidential. Do not hesitate to put down exactly how you feel about each item. We are seeking information, not compliments; please be frank.

CIRCLE THE RESPONSE WHICH MOST NEARLY REPRESENTS YOUR REACTION TO EACH OF THE STATEMENTS BELOW:

1. During independent study in the Multimedia Lab, I felt challenged to do my best work.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
*%	1.8	35.7	26.8	28.6	7.1

2. The way material was presented to me in the Multimedia Lab caused me to feel that no one really cared whether I learned or not.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	14. 3	55.4	10.7	16.1	3.6

3. I was concerned that I might not be understanding the material.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	5.4	35.7	7.1	48.2	3.6

4. I was not concerned when I missed a question because no one was watching me anyway.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	8.9	53.6	7.1	28.6	1.8

5. During independent study in the Multimedia Lab, I felt isolated and alone.

	All the time	Most of the time	Some of the time	Only occasionally	Never
%	5.4	16.1	3.04	17.9	30.4

*Totals may not be exactly 100% due to rounding off.

6. I felt uncertain as to my performance in the Multimedia Lab relative to the performance of others.

	All the time	Most of the time	Some of the time	Only occasionally	Never
%	3.6	19.6	37.5	10.7	28.6

7. I found myself just trying to get through the material rather than trying to learn.

	All the time	Most of the time	Some of the time	Only occasionally	Never
%	5.4	21.4	26.8	32.1	14.3

8. In a situation where I am trying to learn something, it is important to me to know where I stand relative to others.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	12.5	14.3	16.1	48.2	8.9

9. In view of the time allowed for learning, I felt too much material was presented in the Multimedia Lab.

	All the time	Most of the time	Some of the time	Only occasionally	Never
%	3.6	12.5	35.7	19.6	28.6

10. I was more involved in running the equipment than in understanding the material.

	All the time	Most of the time	Some of the time	Only occasionally	Never
%	0	5.4	16.1	23.2	55.4

11. I felt I could work at my own pace in the Multimedia Lab.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	1.8	8.9	12.5	57.1	19.6

12. Independent study in the Multimedia Lab makes the learning too mechanical.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	8.9	37.5	21.4	28.6	3.6

13. I felt as if I had a private tutor while using the audio-visuals in the Multimedia Lab.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	5.4	41.4	10.7	37.5	5.4

14. I found it difficult to concentrate on the course material because of operating the equipment.

	All the time	Most of the time	Some of the time	Only occasionally	Never
%	0	5.4	19.6	23.2	51.8

15. The Multimedia Lab situation made me feel quite tense.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	17.9	62.5	10.7	7.1	1.8

16. Questions were asked which I felt were not relevant to the material presented.

	All the time	Most of the time	Some of the time	Only occasionally	Never
%	0	1.8	21.4	19.6	57.1

17. Instruction via the Multimedia Lab is an inefficient use of the student's time.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	10.7	50	25	14.3	0

18. Concerning the course material I took by independent study in the Multimedia Lab, my feeling toward the material <u>before</u> I had used the Lab was:

	Very Favorable	Favorable	Indifferent	Unfavorable	Very Unfavorable
%	5.4	37.5	46.4	8.9	1.8

19. Concerning the course material I took by independent study in the Multimedia Lab, my feeling toward the material <u>after</u> I had used the Lab was:

	Very Favorable	Favorable	Indifferent	Unfavorable	Very Unfavorable
%	1.8	58.9	23.2	14.3	1.8

20. I was given answers but still did not understand the questions.

	Very Often	Often	Occasionally	Seldom	Very Seldom
%	7.1	21.4	25	26.8	19.6

21. While using Multimedia Lab instruction, I encountered mechanical malfunctions.

	Very Often	Often	Occasionally	Seldom	Very Seldom
%	1.8	8.9	23.2	16.1	50

22. The Multimedia Lab instruction made it possible for me to learn quickly.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	1.8	32.1	30.4	30.4	5.4

23. I felt frustrated by the Multimedia Lab instruction situation.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	7.1	42.9	26.8	19.6	3.6

24. I could have learned more if I hadn't felt pushed.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	5.4	28.6	28.6	33.9	3.6

25. The Multimedia Lab instruction approach is inflexible.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	8.9	30.4	32.1	26.8	1.8

26. Even otherwise interesting material would be boring when presented by Multimedia Lab instruction.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	10.7	44.6	23.2	16.1	5.4

27. In view of the effort I put into it, I was satisfied with what I learned through the Multimedia Lab instruction.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	3.6	12.5	16.1	64.3	3.6

28. In view of the amount I learned, I would say Multimedia Lab instruction is superior to traditional instruction.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	16.1	26.8	30.4	25	1.8

29. An entire course taken by Multimedia Lab instruction with help from the instructor would be superior to traditional instruction.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	14.3	37.5	16.1	28.6	3.6

30. I am not in favor of Multimedia Lab instruction because it is just another step toward depersonalized instruction.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	3.6	33.9	28.6	23.2	10.7

31. Multimedia Lab instruction is exciting and produces a better student response to the subject matter.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	7.1	32.1	28.6	30.4	1.8

32. Multimedia Lab instruction is interesting, and increases student motivation.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	7.1	30.4	25	35.7	1.8

33. Multimedia Lab instruction is O.K.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	3.6	10.7	16.1	66.1	3.6

34. I have a definite favorable reaction to the independent study in the Multimedia Lab; it's enjoyable.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	0	39.3	25	35.7	0

35. The Multimedia Lab material was a repetition of classroom material and therefore not necessary.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	8.9	53.6	14.3	14.3	8.9

36. The accounting course would be better if students attended class five periods per week instead of attending four periods of classroom instruction and one period of Multimedia Lab instruction.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	19.6	44.6	10.7	21.4	3.6

37. I used the Multimedia Lab mainly to get credit for attendance.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	8.9	62.5	8.9	19.6	0

38. If I weren't going to be tested on the subject matter presented in the audiovisuals in the Multimedia Lab, I would not have used the Lab.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	10.7	50	14.3	17.9	7.1

39. The Self-Tests taken in the Student Outlines at the end of each module were helpful to me.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	3.6	30.4	17.9	44.6	3.6

40. Overall, the Multimedia Lab experience was a valuable experience.

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
%	0	25	26.8	30.4	17.9

SIGNATURE PAGE

I certify that I have read and am willing to sponsor this Major Applied Research Project submitted by William E. Squizzero. In my opinion it conforms to acceptable standards and is fully adequate in scope and quality, as a Major Applied Research Project for the degree of Doctor of Education at Nova University.

Bruce W. Tuckman

Bruce W. Tuckman, Ph.D.
MARP Advisor

I certify that I have read this Major Applied Research Project and in my opinion it conforms to acceptable standards for a Major Applied Research Project for the degree of Doctor of Education at Nova University.

Michael J. Flynn

Michael J. Flynn, Ed.D.
Local Professional

This Major Applied Research Project was submitted to the Central Staff of the Nova University Ed.D. Program for Community College Faculty and is acceptable as partial fulfillment of the requirements for the degree of Doctor of Education.

Edgar Beale

Central Staff Committee Member